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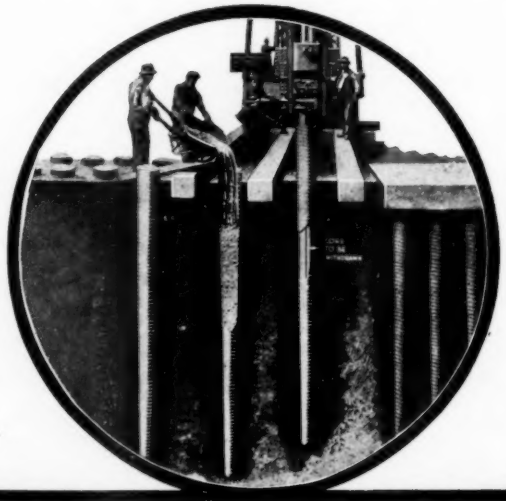

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THE AMERICAN ARCHITECT

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Government Housing: What Will Follow?

By C. GRANT LA FARGE, *F. A. I. A.*

IT is too early to do more than to speculate, however advisedly, upon the effect that the housing for war workers, undertaken by the Government, is to have upon the general question we somewhat vaguely indicate by the term "reconstruction." It were better called "re-adjustment," so far as concerns this country.

Those of our citizens who, as individuals or as associations, have long been concerned with the problems of town planning and housing; who have convened and discussed, preached and toiled in the face of a public mostly blind and indifferent; these have turned eager eyes upon what must have seemed almost a miracle: The actual venturing by the United States Government upon the construction of dwellings for working people, upon a large scale and, so far as the personal characters and abilities of those employed for the task could guarantee, in a manner and upon terms that would be a very long step in advance. Those same eyes had scrutinized the examples furnished overseas, especially, perhaps, the remarkable performance of Great Britain in war time. To thoughtful persons, open-minded students of the subject, the conviction was not new that the living conditions of working people, outside the factories, were at least as important as those surrounding their working hours. They measured the question in terms of citizenship, not satisfied that any purely economic formula was adequate to cover a subject so complex. Not that radicalism should be suspected of dismissing the necessity for a sound economic basis, but rather of believing the commonly accepted one to be unsound. Housing must pay, of course, but must the standard of payment be an irreconcilable incompatibility between the workman's resources and such living conditions as are essential to the health, contentment, efficiency and well-being of himself and his family; yes—let us face it—even to their honorable pride and their opportunity for that "pursuit of happiness" recognized by the founders of this republic?

It would appear to be so, if the solution of the problem of industrial housing were to be left entirely to the laws of supply and demand, as interpreted and made use of by the speculative builder chiefly, with an occasional contribution from some enlightened association (of which New York City affords a notable example), or from industries become aware of the important part to be played by housing in stabilizing labor. The limits of this brief article forbid more than this mere glance at a great and many-sided question, but even the glance may suggest that if any lessons are to be gleaned from governmental entry into the field, they are worth attention.

There are such lessons, many of them, and they will doubtless be elaborated in various ways; one only will be indicated here. It has to do with production. Occupancy and its methods; terms of rental and sale; plan of holding the properties; their management; the effect of the housing—these matters at this writing lie in the lap of the gods, some of whom thunder upon Capitol Hill.

In ordinary circumstances, the great bulk of low-cost housing is a real estate speculation pure and simple; much of it is vicious. The common phenomena are familiar: some land secured at a bargain; cheap houses crowded as close as the law will permit; the minimum of ground improvements; poor plan; no continuing responsibility of the promoters; no decent system of management, probably none at all. The whole thing is unloaded by shrewd advertising methods and is left to take care of itself, which it usually does by becoming a slum. Not that this is universally the story of speculative building; some of it is good in its way, rather limited so far as design of houses and their surroundings goes; or a fair plan of disposal by stable companies. But —and it must be understood that we are not here considering the few exceptional instances—in ascertaining, analyzing and relating the many factors involved in a proper determination of the investment, nowhere is there brought to bear such an assemblage of qualified skill and opinion as the United States Housing Corporation has had at its command.

To set forth these factors it will be well to see how

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they presented themselves to the Corporation, as the subject of its methods of investigation.

It must be clearly borne in mind,—and the fact is all the more illuminating for the relevance of the methods in other circumstances—that the function of the Corporation has not been merely to build homes for industrial workers. Broadly stated, it has been, proof of the need being duly established, to find or to provide housing for the workers essential to munitions production, in whatever manner, building being resorted to when other means were exhausted. Its aim therefore was a war aim; its specific object to reduce a specific labor turnover; it was not a "welfare" organization. But inasmuch as the root of the trouble, no matter what the purpose or range of the remedy, was always the same—congestion; insufficient dwelling-places; living conditions ranging from unsatisfactory to intolerable, it had to take into account every single fact ascertainable, most decidedly including those relating to the communal facilities such as markets, schools, churches, amusements and recreation. This is, or ought to be, self-evident.

So the chief objects of an investigation, in the case of any applicant community, were to discover the number, kind and condition of *all* local industries, engaged wholly, in part, or not at all in war production; the number, classification and earnings of their employees, in war and in normal times, past, present, required, or expected; the rate of labor turnover in each plant, with evidence as to its cause; the residence of employees, local, or at a distance, with schedules, rates of fare and quality of transportation service; whether or not there was housing unavailed of in those other localities, and if so, how much, and of what sort; the quantity and classified quality of local housing, and the extent to which it was occupied; the organized efforts, if any, made to find living quarters for workers and their families; the sanitary conditions and the state of public utilities; average rents and purchase prices; land values; available building sites; facts as to schools, churches, stores, amusements, parks, playgrounds, recreation welfare organizations; amount of house building done or projected; condition of the banks and loaning companies, particularly as to building loans; and any other information that would aid in determining the nature of the community, its present condition, its normal state and, very specially, its quality of industrial prosperity as a stable thing.

Speaking upon personal responsibility, as one who made a considerable number of such investigations, and who is familiar with many made by others, it is not outside the facts to say that conditions disclosed over and over again were such as in any fair view of human surroundings should be called scandalous and a disgrace to a people claiming the standards of civilization and some measure of idealism. The astonishing, and the degrading, thing is not that they were revealed by inquiry, but that such inquiry should have had to be made in order to disclose them. For they were not due to the war, but had been there for years under our eyes, plain to be seen had we cared to see them. The war pressure accentuated and intensified them, it is true; it was the fierce search-light that so displayed them that we could no longer be blind; it made the poisonous weeds grow so fast in the field from which we had to reap a speedy harvest that we had no choice but to do some clearing—but the weeds were there through our neglect.

The policy being as already stated, to resort to building when other means were exhausted, the obvious first of these means is to make use of all discoverable vacancies of proper character, local or within reasonable reach, by placing workers in those vacancies. This was the function of the Homes Registration Service.

The object toward which it worked was the occupation of all fit living accommodations within reasonable radius of the plants by war-workers up to the point where all were suitably accommodated at prices commensurate with the wage earned. Various considerations enter in to render this a complex problem. One community might show a surplus of lodgings for single men and afford scanty opportunities for workers with families. A locality might supply a thousand rooms suited to the needs of the workers earning three dollars a day, and only a score of the kind sought by the six dollar or more a day artisan, or vice versa. Lodging houses might abound where the demand was heavy for complete boarding or housekeeping conditions; and boarding places be the rule in the vicinity of a plant whose labor, for reasons of overtime, or high pressure work, required the other system.

Vacancy canvasses were made, covering all unoccupied houses, flats, and in the most pressing conditions, even rooms which householders might be induced to rent. Houses and rooms were graded, not only as to convenience and price, but also as to cleanliness and sanitation, and those not up to standard in the latter respects put upon a deferred list. Lists of all available accommodations were maintained in each community at the Homes Registration Office, and checked and kept up to date by daily reports and frequent inspection. Field Agents were appointed who visited and established Homes Registration Bureaus in about seventy cities in the United States, where need for housing existed.

Where there is housing saturation in the vicinity of the war work plant, there may yet be, within reasonable distance, some community that offers housing vacancies, or, if not convenient, it may be rendered so by the establishment of new or improved traffic facilities. In such cases, to accomplish these was the object of the Transportation Division; in so doing its function coinciding with that of the Homes Registration Service; viz.: to avoid where possible the expense of constructing special houses for war workers. By special train, trolley and boat service, timed to the schedules of the war factories, and by a simple rearrangement of schedules in some instances, this relief was afforded.

In investigating congestion due to war work, the Corporation received its information as to the importance of the output of the locality in the war program from either the Army or the Navy. The localities were rated "A", "B", and "C", and when it developed that the appropriation from Congress would not adequately take care of all the projects that demanded relief, the Corporation necessarily tried to give relief to those of primary importance. This was the function of the Priorities Section of the Requirements Division. In those communities where funds were not available to give relief, or where projects for house building had been abandoned because the locality expected the Government to build, the Housing Corporation made an effort to stimulate private capital to take care of the housing shortage for industrial workers.

The Corporation indicated to these communities that it would secure for them priorities as to materials, the license to build under proper restrictions, safeguarding the worker as to rental and sale, and that wherever possible the Corporation would secure Government prices for these projects. All plans were passed on by the Corporation before the license was issued, and a sworn statement of stipulations in each case was drawn up and signed by all the parties concerned.

There now remained one step to be taken to bring about a better distribution of labor through its diversion from the less essential industries to those making munitions of war, in conjunction with a redistribution of war contracts by placing them where factories were idle, or partly so, and where there was labor supply and housing. Because there nowhere existed any such industrial survey as gave the requisite information, the Division of Surveys and Statistics was formed, which acted as a very complete investigating Bureau, working with the Regional Advisors and the Labor Control Boards in the various centers of activity.

A complete list of every factory employing over ten men was made in an appreciable number of cities, including a statement as to the kind of work that the less essential factory could take on as a war measure, and how long it would take that factory to change over. In this way it soon became evident that in many localities no housing would have to be provided if a certain percentage from the less essential factories were diverted to those factories engaged in war work. The redistribution was the work of the War Industries Board, to which body reports were made.

In this cursory fashion are indicated those methods employed other than the construction of housing. The manner of handling that must be as briefly touched upon, because it is not the purpose of this article to describe the workings of the Housing Corporation.

Besides a very expert Real Estate Division, charged with the acquiring of land for sites, there were the technical Divisions of Architecture, Engineering and Town Planning. By these, covering the field of design, a vast amount of valuable information and material was collected and digested, preparatory to the beginning of the projects to be undertaken. Minimum housing standards were prepared; type designs elaborated; standard details and specifications adopted; instructions of all sorts for employed designers worked out. Special researches were made covering schools, hospitals, cafeterias, relations with municipalities as to the installation or extension of public utilities, and the very important matter of varying building codes. Experts of high grade studied in detail questions of heating, plumbing and lighting, and established new devices of economical character. The subject of building materials, a very vexed one under the constantly increasing restrictions of war-time, was under constant scrutiny in active collaboration with the War Industries Board. A corps of skilled estimators, in the Requirements Division, made careful cost analyses and quantity surveys; by a very thorough plan, materials in quantity were allocated, ordered, and arrangements made for their shipment so as to be on hand when required for construction.

The designing of projects was entrusted to Committees of Design, each consisting of Architect, Engineer and Town Planner, selected from among private practitioners of high professional standing. They worked upon a contractual basis founded upon the idea of war service, and affording them a remuneration far below their customary receipts. Needless to say, though not to be described here, very complete arrangements were made as to submission and approval of drawings and specifications and work both in office and field. Every possible emphasis was laid upon two points; that designers

were to work as teams, and that their clients were the workers for whom the buildings were to be built.

Closely allied with the work of design was the Operating Division, which would have charge of the properties when created. As managers of these sometimes large communities, their function would be fully as important as that of their creators; hence their oversight was necessary at every stage of the development of each project. Housing is not merely the building of houses; it is the sudden creation of new communities, perhaps villages, perhaps fair-sized towns. Their conduct; the physical up-keep of the dwellings; the maintenance of sanitary conditions; the abatement of nuisances; the adjustment of disputes which unadjusted lead to the police court; the general welfare supervision of the populace; the fixing of rentals and priority of occupancy; the maintenance and establishment of desirable social and recreational activities—these are management. The purpose of the Housing Corporation was far from the irresponsible, get-rich-quick, unload-it-on-'em-anyhow-and-get-out-with-the-profit method of the more disastrous forms of speculation in real estate and human needs.

To the work of the Construction Division only passing references may be made; upon this large and most competent organization devolved the making of contracts and the handling of the work to be done by the contractors in the field. To describe its extensive function and machinery would require an entire article.

What then is the lesson?

To the casual observer the general proposition that houses were to be built for workmen would seem a simple one. But actually it is a large, complex, human and economic problem, with so many sides to it that for its solution there needs be invoked the joint endeavor of those in numerous and greatly varied walks of life, ordinarily thought of as unrelated.

The union of all these forces does not, in ordinary circumstances, occur. It is possible only where the magnitude of operations upon a wholesale scale permits the absorption of the overhead expense it entails. The United States Housing Corporation has worked upon such a scale and has therefore been able to assemble into one closely woven organization these many agencies. Here have been owner, manager, real-estate expert, designers in all branches, constructor, experts in the technicalities of building, of transportation, of schools, hospitals, living conditions, and the law. The special knowledge of all these has been available for exercise at the moment when needed and continuously throughout. The advantage is easily demonstrable; to have, for instance, the advice and co-operation of the builder who will construct, and the manager who will conduct the property, from the very inception of the planning and through all its stages to completion in all its various parts, is obviously beneficial; the same is true of the larger group. It is also a fact that these experts should all be the best in their respective lines. The Corporation, because of the importance of its work and through the patriotic appeal inherent in its objects, has been able to command such talent. The organization has functioned as what may fairly and appropriately be called a Team. In so doing there has been afforded illuminating evidence of the essential inter-dependence of its factors and of the value of so uniting them when the problem of industrial housing, whether for war workers, or those of peace, is to be adequately solved in its many economic and social aspects.

Even so slender an outline as this of the Corporation's activities should not fail to include some word concerning their spirit and quality. The employed designers have shown an enthusiasm and devotion, a glad acceptance of severest toil with only war-time remuneration; have manifested a degree of technical skill and ingenuity, that reflect high credit upon the professions concerned, their mastery of their arts and their characters as loyal citizens. The same thing might truthfully be said about the great team which has served the Government, but perhaps that should not come from one whose privilege it was to be a member. He can, however, say that its leader, Otto M. Eidlitz, has come out of his conduct of an almost inconceivably difficult and trying task, with not merely their respect but their warmest personal affection.

For private enterprises, and in the common run of things, no such uniting of the forces may be anticipated. And yet the problem of industrial housing, still in its infancy, is one that this country has got to solve in its human as well as its financial bearings; in its effect upon a better citizenship; upon the Americanization of both our foreign-born and native populace; upon the rational treatment of labor unrest. Surely we should not sink back into our *laissez-faire* treatment of this, among the other lessons that the war has been supposed to teach us—surely the fruits of the great governmental experiments should be cultivated and ripened.

The country is undoubtedly not ready to accept housing as a Federal enterprise. But it would seem as though a Federal Bureau could exercise a useful function in gathering together, analyzing, digesting, extending, the great mass of relevant facts and experience growing out of the work so

far accomplished. This central agency might in many valuable ways make this knowledge available to all those concerned, whether States, municipalities or private organizations. There will long be need for a Homes Registration Service, as well as for Employment Agencies. There is great need for really complete and competent industrial statistics. There is the greatest kind of need for adequate surveys such as Philadelphia, Boston and Chicago have been making, to set forth facts as they are and out of them to make what we so sadly lack—plans. When you say housing and transportation there is but little you leave out of living conditions, industrial distribution, employment, highways and railways and waterways, ports and terminals. In the stimulation and correlation of such surveys, this central Bureau could play a most important part. We need to know far more than we do about the cost of housing, of new methods that will reduce it; of the relation between that cost and the paying power of the wage earner. Here is work for such a Bureau.

We need to work out a system of loans to workers who want homes, at low interest rate and on long-term payments, that will drive the loan shark, on whom that worker now so largely depends, out of existence.

We need a competent, exhaustive, continuing study of a subject that is vital to the well-being of the republic.

We need to realize that the old days of prating about town-planning and the education of popular taste from the top down are gone forever, and that the way to build anything at all is to begin with the foundations.

We need to open our minds to such ideas as are advanced in these extracts from a report to the British Ministry of Education.

"Opportunities for education depend to a considerable degree upon the character of the houses in which the people live. The unsatisfactory condition of working-class housing, as regards both quality and quantity, in town and country alike, is now realized on all hands. This problem, though accentuated by causes arising out of the war, existed even before the war in acute form.

* * * * * *

"Such conditions, it is only too obvious, militate against the full use and right enjoyment of life. It is difficult often, indeed, impossible, for badly housed men and women to develop intellectual interests, and where such interests have been developed, almost insuperable obstacles are offered to their full realization. The information submitted to the Committee on this question is unanimous in condemning existing housing conditions; and students, teachers, and social workers are in full agreement as to the very serious handicap imposed on those who would wish, as one puts it, 'to do more than work, eat and sleep.'"

* * * * * *

"Too little attention has been paid in the past to the reaction of the physical environment upon the aesthetic and moral standards of the people. Contact with ugly and depressing surroundings tends gradually to dull the finer senses, and people who, under more favorable circumstances would shrink from the drab and sordid environment of large areas in all our towns, become, through familiarity, oblivious of its ugliness. It is as important not to overlook the subtle degradation of mean and sordid surroundings as it is to remember the educational influence, none the less real because unconscious, of a clean, healthy, dignified and beautiful environment.

"We have approached the matters dealt with in our present report from the human rather than the economic point of view. If the individual is to make the most of his powers, if the citizen is to be worthy of the responsibilities thrown upon him by the ever-increasing complexity of life in a modern community, in other words if education in any broad meaning of the term is to become a reality, certain definite conditions of life are indispensable. The paramount consideration is that of the individual as a member of society. Material progress is of value only in so far as it assists toward the realization of human possibilities. Industry and commerce and the social conditions which are in a large degree dependent upon them must in our opinion be regarded from this point of view, and if they cramp the life of the individual, no amount of economic argument will suffice to justify them. * * *

"We do not think, however, that there is of necessity a fundamental antagonism between ethics and economics. Adequate pay, reasonable hours of labor, the suppression of heavy, degrading, and monotonous forms of manual labor by machinery and improved processes, the provision of holidays, the introduction of human relations and of the social motive into industry, healthy homes and cheerful environment—these are the indispensable conditions of economic efficiency; they are also among the elementary rights to which the citizen, as such, and in virtue of his responsibilities, is entitled."

We may not all agree with all of this. We should agree that the problem is urgent; that what we have done is but a beginning; that the old methods are insufficient.

Architectural Office Organization for Post War Conditions

Part II

By Daniel Paul Higgins

THERE are special reasons why the American architect should be particularly interested in planning for the period after the war. Today he is virtually a stranger in his own domain. Whichever way he turns, whatever phase of building he looks at, all is changed under the strangely pallid mercury lamp of war. Engineers and contractors are in the limelight and hold the center of the stage, in fact, the very atmosphere in which he was accustomed to work seems lurid, hectic, altered. Slowly the architect is becoming aware that business not only will not be, but cannot be, what business was before the war.

Can an architect doubt the necessity for studying and planning concerning the time after the war? The great war time machine swallowed up to a large degree the peace time architect's machine, but having finally put the great war machine into successful and effectual operation, the live architect is thinking of the next big job, which he knows is after-war adjustment—rehabilitation of peace time business machine to cope satisfactorily with the transition from the old to the new demand for architects big enough in organization to manage scientifically and correct the discordant elements that always accompany changes in conditions and methods.

The architect who is on the front line here at home in the industrial part of warfare can see the opportunities the newly made millions will offer to the architects and builders after war, as well as the great need for schools, public buildings, banks, monuments and residences made necessary by the curtailment of all private buildings in the past few years and new conditions and the development caused by the war, all of which will demand efficiency unthought of before by architects.

The first year or perhaps two years after the war are admittedly the critical ones. No one doubts that after several years when demobilization and readjustment will be general and complete, there will be unprecedented building prosperity for America. It is the vital interest between the first authentic hint of peace and the time when the world is in full operation again on a peace basis that gives pause to the thinking architects.

The more analytical, constructive minds wish to leave nothing to faith or feeling, but are keen for constructive action to be begun at once, aggressively, intelligently, with a sure practical touch and no grumbling log-rolling, or inexpert dallying. They should have that business imagination which has made Americans famous and should forge this imagination into reality. They should apply the tools of organization and analysis to the situation and force the problem to an issue now with definite departmented plans of action to take care of the coming business requirements by men in their organization who are especially trained in their particular function with skill enough to get results.

There is a significant lesson to be drawn from the Government's attitude during the speeding up of the war. The architect or builder who has had an organization to fit the crisis, regardless of a long standing reputation as architect or builder, was given work to be done under strict Governmental surveillance, as to method and speed. Many architects who have felt that their reputation before the war was beyond reproach, when put to a severe test and under the business audit of a Government whose only interest is results, were keen disappointments to the Government and largely the cause of Government recognition of the so-called Modern Building Organization.

The lesson learned by architects who could never associate efficiency with architecture before was that efficiency was first sought by the Government as the best, easiest and most economical means of production.

Some architects hate the word efficiency, regarding an efficiency expert in the same light as a religious crank, never reasoning that without efficiency water and oil would have to be carried on the head by a carrier as of old, instead of flowing through miles of pipe lines to the consumer. That, under the rules of efficiency one man by development of specialization can produce a hundred times as much in eight hours as he formerly could when he was a novice in nearly everything he tried to do and worked sixteen hours per day. Efficiency permits the much condemned meat packer to sell all the meat on a steer for less money than he paid for the steer and yet grow rich on the by-products. Could the country butcher do it? Not any more

than the architect without efficiency can make the profit he ought to out of his practice since he has not discovered his by-products.

To do a deed with maximum intelligence using the most highly developed instrumentality possible is efficiency, hence when the architect's practice reaches the point where it is no longer possible to be carried in the mind of one man, there exists a choice between two principal courses. In one, and undoubtedly the exceptional case, the architect can himself continue to oversee and direct the business functions of his office. It is then most essential for him to obtain an able and efficient head for his department of design. The other alternative, and this is undoubtedly the one most architects would prefer to follow—would be to keep in touch with the design and to control its policy, often with the assistance of a qualified designer and who is the nominal head of that department. When the minds at the head of important departments, such as those of design, business and job supervision is of recognized and special ability, they can carry their specialty to maximum efficiency and with a minimum of interruption. This specialization of function by men scientifically trained in their specialties permits the architect to be relieved of actual participation in detail and thereby allows him time to secure and promote new work and properly attend to and supervise its design. With the aid of exact accounting and other statistical information, he is in a position where he can best control his practice with profit to himself and satisfaction to his client.

The welding of these units into a consolidated system by the architect, scientifically assisted by a proper business organization, with all its parts properly co-ordinated, will then be adequately prepared to furnish the most efficient results in the most economical way.

A few progressive architects have recently developed a science of specialization and co-operation in their organization where the individuals are united into a systematic body, purposed to work for a common end, with appointed specialists in authority over divided or sub-divided parts of a whole, so that the duties of each shall correlate and co-operate with all to minimize cost and avoid unnecessary double handling of matters following the order of their function and their relations to one another.

The accompanying chart and key are introduced for the purpose of showing in simplified form the departments of this modern architect's organization. A careful study of the chart and key will convey some idea of the relation of these departments discussed in the foregoing pages and some others of which brief mention is made in the last section of this text. The square shown under each department indicates the subdivision of the functions which properly comes under the control of that department. The nature of the work which applies to each department will be found upon reference to the key.

Architect

The principal function of the architect is to find a client, then to find out his requirements or to create in the client a desire and then to design something to fill that want. To find a client and to create a desire can be done more often through the science of promotion, which entails a great amount of missionary work. It requires a comprehensive knowledge of architecture and building in all its phases and an ability to talk forcibly and intelligently not only on design and building construction, but on matters of realty financing, know the conditions of the loaning market, and the extent of the loaning facilities of important institutions. He should be able on examination of data furnished him to make such calculations as to the cost of the building under consideration and to be in a position to speak authoritatively as to the advisability or need of any important items included or omitted. Unlike many architects who take only an apathetic interest in the promotion of a project until they secure the commission the modern architect confers with the principals and when and where necessary advises changes in the financial scheme, or suggests such modifications in the drawings or specifications as will bring the project within the available appropriation and properly eliminate waste and extravagance.

This phase of promotion brings in the necessity of an up-to-date organization along the lines of specilization and co-operation to assist the architect with the preparation of business and structural data upon which devolves a large part of the credit for most of the work secured.

Business

The individual in charge should be a real executive, scientifically trained in modern business methods, with a higher knowledge of accounting. It is hardly expected that he should in the very beginning have a thorough knowledge of architects' and builders' organizations, but in a short time by a continuous specialization of study and the application of his previous training and ability he can make himself proficient in such matters and the motive power of all other forces.

His mind should be garrisoned by a disciplined army of ideas, always alert, marshalled and thoroughly prepared to hurl himself on any important business organization or promotion problem.

His department is the central point for all systems and office routine. Correspondence and other matters, incoming or outgoing, are received, checked and distributed by the executives in charge; all matters pertaining to accounts, both as regards office and job, are recorded and supervised. Contracts, extra orders and certificates are audited and signed by him. In the case of orders and certificates, they are first approved by the supervising architect.

The general business policy of the entire organization comes under his control as well as all confidential details of promotion, etc. Clients are first received by him and when necessary he refers them to the proper person directly connected with the matter under discussion. He prepares regularly an adequate system of records which are indispensable to the architect in keeping him in touch with every phase of his practice, providing a constant barometer of conditions, and are the means of enabling the heads of other departments to be familiar automatically with every detail necessary to its more successful operation. In addition to the various financial reports, a general report from each department head is made on the condition of work in his department, wherever important and at least once a week, and all passed to the business department, where they are placed in a loose leaf book always kept before the architect on his desk ready for instant reference in the order of the departments. This method places the architect in a position where he has within reach the detailed conditions of all jobs, etc., should the client unexpectedly call on the phone or meet him to discuss some of them. By his prompt answer to questions and familiarity with such details, which questions ordinarily are referred to others, or are deferred until the architect interviews others who might be out of the office or even out of town, he conveys to a client that he is personally in touch and familiar with all conduct of his work.

He takes an active part in the promotion of new work and is capable of performing many other important functions, perhaps too obvious and numerous to mention here, that under the old system were neglected.

Further to complete the efficiency of this department, an attorney who is a specialist in the law of architecture and building is retained on a reasonable annual basis to confer, advise and direct all legal affairs and to approve all important contracts —a measure that has proved valuable and has often prevented serious legal difficulties.

Under so highly developed a business administration the architect and heads of departments are entirely free to preserve their individual and important specialties with the maximum of efficiency and a minimum of interruption and annoyance.

Before proceeding with a brief description of the function of the designer, supervising architect, interior decorator, and engineer, it would be of considerable value to the reader to refer to a series of articles by Prof. Howard Dwight Smith of the Ohio State University in the numbers of the *Architectural Review* in the departments mentioned above; articles written in co-operation with the writer on the "Business of Architecture." Prof. Smith's training and experience equip him to cover intimately the functions of these departments and their relations to one another. He has dealt thoroughly and helpfully with the problems of these special departments in this same organization as advocated in this article.

Designer

This department is headed by a clever designer and architectural renderer who works with the architect from the earliest conception of a problem, and after a definite scheme is finally accepted and decided upon the job is turned over to him. He has the ability to improve the design from the varied viewpoints of conception as to use of materials, texture and ultimate effects. He has absolute control of all designs and no work leaves this department without being studied from all angles. Great success can be attributed to the use of models which are very often carried considerably into the selected materials themselves. Under this system which has consistently developed to the point of perfection, the architect himself is seldom required to give any further time to the details of design after a scheme is once finally determined upon.

Supervising Architect

The head of this department whose ability is exceptional, in the sense that he has been trained and experienced in both design and structural engineering, is regarded as the architect's assistant in matters pertaining to the management of building after they leave the designing department. He possesses rare executive ability and in general he is able to represent the architect in the most desirable manner possible.

He acts as a general superintendent and has direction over engineering and inspection and is held responsible not only for the construction of the work, but also for the artistic character in which the work is executed.

His designing ability and general good taste are most helpful factors, as he is then always in perfect harmony with the designing department, which permits him to visualize the final effect sought by this department. He is fitted to discuss and to decide in a final and satisfactory manner all ques-

tions arising to affect both design and color during the execution and completion of the work. By being able to discuss such points intelligently with clients, he saves the architect many unnecessary interviews and gets in the end the full artistic effect and refinement of detail that is desired.

Interior Decoration

In this particular organization this department has developed in a few years in the most amazing manner due to the satisfactory results of having a man in charge who has specialized in all phases of interior decorating. In addition to proving exceptionally profitable from a viewpoint of money, it has likewise added to the good reputation of the architect.

Criticism of interior designs, the supervision of construction of special interiors, models, etc., in the shops and on the building are made by him. He is responsible for harmonizing the work of all the many different trades and crafts so necessary to carry out to completion the best grade of interior decorative work.

The architect derives many benefits from the completeness of this department, for, in addition to the profitable monetary returns and the reflection of good credit for the execution of work, he is free to devote his time to carrying his own ideas to perfection, and, furthermore, by the assistance of the head of this department, who is able and qualified to give sufficient time and pains to determining and to carrying on all the fine and complicated minutiæ with which the final detail of decorating, furnishing and fitting up the building are ultimately concerned, the architect can assume the credit for the entire project.

The client is better served and everything pertaining to the completion of the building is carried forward hand in hand under the direct influence of the architect, thereby insuring better results than would otherwise be obtained. He exercises control over and makes decisions in the first place as to the kinds of material and how the work is to be done.

Engineering Department

While engineering may be divided into two departments, structural and mechanical, in this organization they are united under one head. Under the head of structural are included all steel, reinforced concrete and similar work, including the designing and, where work is laid out by contractors, the checking of same. Under mechanical is included the layout of all mechanical plants, including plumbing, lighting, power plants, refrigerators, etc.

The engineer takes care of all draughting and specifications in connection with the above classes of work, affords general practical guidance for the draughting department, checking all drawings as to their correctness and practicability. He makes estimates on work, and from time to time is called upon to visit the various operations for the purpose of seeing whether the work under his department or the work as a whole, as the case may be, is properly carried out.

All practical work in the draughting room is laid out by the engineer and it is essential for him to be constantly attentive to see that standard practices are developed and after such development are put into service. He also sees that all data are promptly and properly classified as to specification of mechanical equipment, etc.

Draughting Department

In another and even larger way the same methods used for planning work in the engineering department apply to the draughting department. For example, one job or several jobs are given in charge by the engineer to higher class draughtsmen in the department known as "job captains" who lay out the work ahead of less expensive and less experienced men, applying the principle of the division of functions and dividing each job into parts, so that each part can be done in perfect and harmonious sequence. Here, again, the engineer is of service, for, as has been explained, he possesses the higher technical ability and a keen sense for relative importance of detail.

The difference between a large practice and a small one is largely one of vision. The basis of success is commonly self-made.

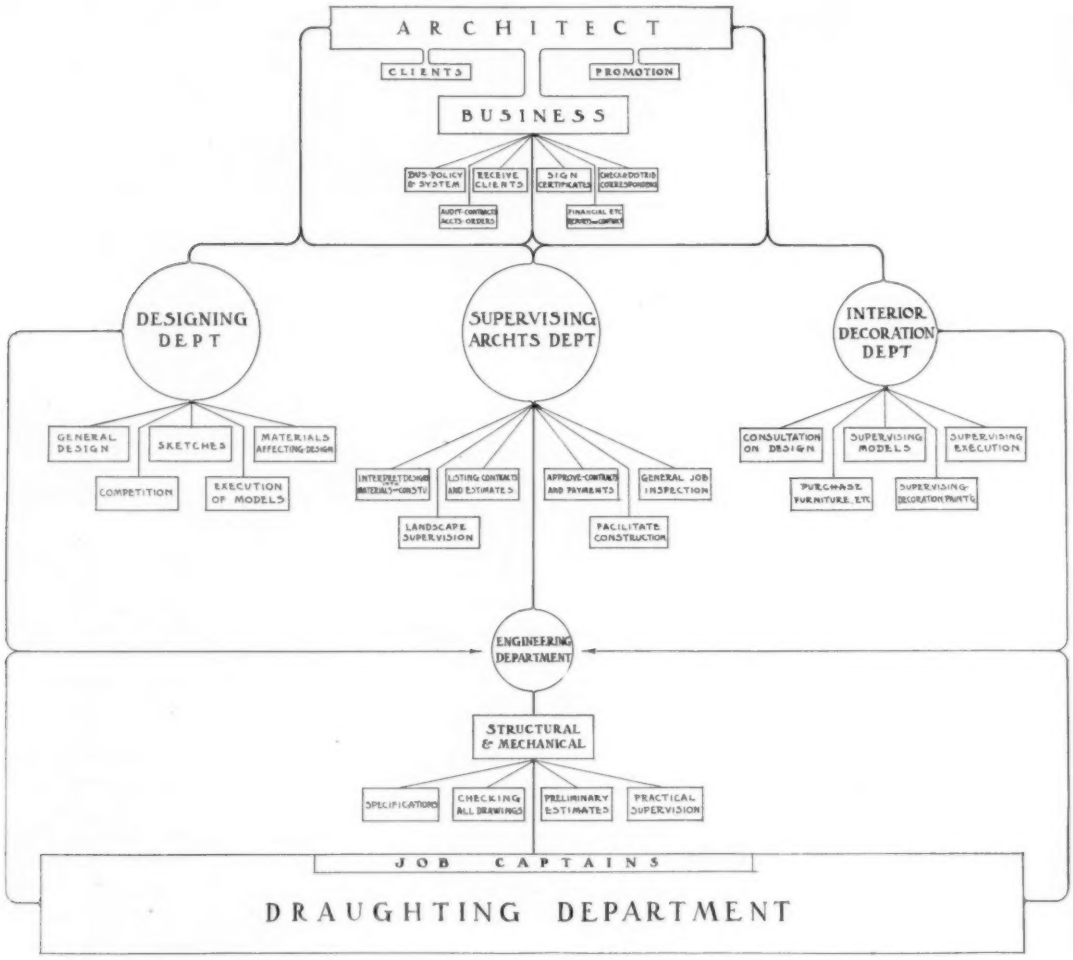
The architect who sets definite limitations on his practice by a lack of perfection in method and organization will probably fall short, even of those, but the architect who is big enough to decide that he can improve his organization to handle men and larger work with satisfaction to his modern client fixes limits only as stages in his career.

This wrong point of view hinders the progress of more architects than any other cause. The architect who has a small practice, calls himself a small architect, wants to know only about systems and organization of other small affairs and dismisses the lessons from larger and more successful architects with the remark, "That's all right for his office; he is a big architect, but it won't do for my office or policy" is the architect destined for a small and unremunerative practice.

Let us grant that a small practice does not require and cannot well bear the expense of conducting affairs in the same fashion as a larger one and that it would not be practical to divide the function of the practice among departments, as the architect or someone in his employ must generally be the

department heads rolled into one, it would be feasible and economical to have an expert accountant or business man proficient in architecture and building methods look over his affairs and advise him periodically, in the same manner to employ outside practical tabs on all engineering, structural and mechanical equipment, etc., when necessary. The architect will then be applying the principles of organization outlined in the article, profitably and within limits of his business.

In conclusion, this talk is not a plea for any over-elaborate, expensive, time-consuming, hair-splitting system, which is more apt to throttle than to aid a small practice. It is simply a review of the general principles of organization by which every successful business, large or small, must be conducted. System, if properly understood and not confounded with red tape, is perhaps even more essential to a practice where the architect must carry the whole burden than to a large practice where many contribute their individual talents to the whole.



Report of Sub-committee of the Joint Committee on Reconstruction After War

Illinois Chapter, A. I. A. and Illinois Society of Architects

J. C. LLEWELLYN, *Chairman*

AS chairman of the committee to consider steps to be taken to permit architects to do work on a cost plus fee basis, and still retain professional standing, I submit the following:

As stated in the minutes, the resolution appointing the committee might be interpreted as referring to a scheme of charges, discussed and practically endorsed by the American Institute of Architects in convention a few years ago, when the architect in lieu of a straight percentage on the cost of the work was permitted to charge a fixed sum for his service and add thereto the actual cost of drafting, supervision, expert service and an allowance for office overhead.

The purpose of the motion, however, as I understand it, contemplates a discussion of the question as to whether or not forces are at work which will make it advisable for the architect to assume a larger supervision of the construction of work under his care than formerly, extending even to the purchase of materials and employment of labor, and charging for this service a fixed amount plus the cost of preparation of drawings, supervision, etc., or a percentage on the cost of the work as charges are now made for preparation of drawings and that supervision now recognized as a proper part of the architect's service, and considered professional.

Much depends upon the definition of a profession and the limitations put upon it. In general, the term profession implies an occupation requiring a liberal and special education and discipline, and the practice of the profession implies a personal service employing the knowledge gained by such education and discipline and the experience resulting from practice. This service is rewarded by a fee, supposedly commensurate with the service rendered. Law and medicine are the well-known examples of the professions.

Architecture is no exception to such definition, but in practice the service rendered by the architect often becomes less a personal service, than a use of special knowledge, in directing and guiding the labor of a number of others in performing certain service. I doubt if anyone will claim that the service so rendered is any the less professional, but rather the claim may be made that the architect is filling a larger place in the second instance than when confining himself to his own personal efforts. Furthermore, it is a matter for debate whether the architect who renders the service to his clients he is supposed to render, will be regarded as a professional man at all by the public, because he must combine with whatever sense of proportion, good taste and beauty he may have acquired by reason of environment or by education or travel, those qualities which in the eyes of those about him, place him in the realms of pure business.

In fact, the methods we employ and include in the term "professional practice," with its governing codes, etc., is being approached steadily by those we have been pleased to call contractors and who have had to do with the actual business of building only. In fact we hear now of "ethics" among builders, as witness the scheme of organization proposed at the convention of general contractors held in Chicago recently. Is it not possible that the chief value of our term "professional" is to furnish a topic for debate or speculation, and has but little to do with the service architects render their clients. The real question is, whether our methods permit us to keep abreast with the rest of the world, and, if not, whether we cannot change them and retain the spirit of what a code of ethics aims at—honorable service to our clients and fair play to all others.

As to changing conditions under which we are working:

First—For a number of years there has been a gradual increase in and instability of prices for material, and also an increasing scarcity of, and a consequent instability in cost of labor, which have rendered the letting of contracts under the old system of lump sum, uncertain and unsatisfactory to contractors, so that they are advocating, in order to eliminate risk of loss to themselves, the adoption of the system known as cost, plus a percentage or fixed fee, in the handling of construction work. The conditions brought about by the war and the fact that the Government placed its stamp of approval on the cost plus fee method in the greater part of its war work, will serve to bring this method of doing construction work into more general use, and contractors will thus approach in methods of charges at least the "professional method" of a fee or percentage on cost.

The system has its faults, which are known to

all of us, and is capable of abuse. It depends, more than the lump sum system, upon the integrity of the contractor and a conscientious regard for the interests of an owner, whose interests are likely to be lost sight of in a majority of cases. The attitude of labor toward percentage work is well known, whatever common interest there may have been between contractor and employees to save contractor from loss under lump sum contracts is absent under the cost plus fee system, and the indifference of labor to an owner's interest with resulting decrease in efficiency is well known. Labor is insistent in its demands, and the uncertainty of the character of their demands constitute one of the principal reasons for abandoning the old system. The fact that labor will continue to be an uncertain element of cost in any building project must be taken into account and will have its effect on methods of contracting and our practice as well. The system will impose upon architects the checking and auditing of bills, unknown under the lump sum system, and will greatly increase their work without corresponding recompense.

Second—The work of the war has demonstrated the value of co-ordinated and organized effort in spite of the drawbacks bound to occur because of the circumstances under which the organization was affected. It remains to be seen how far the Government, now that the war is over, will retain control of or will attempt to direct construction or building in those lines which have a direct influence on the welfare of the public. Whether the Government will assume any part of this direction or not, the fact remains that the war has given a great impetus to a movement begun before the war, having for its object the proper housing of people in rapidly growing cities and towns, especially in workmen's communities, and that this work is apt to be done under co-operative or organization methods more than heretofore. To handle this work will call for a fuller co-operation of the architect, town planner, utilities engineer and builder, in which co-operation the directing hand should be that of the architect. This particular class of work will bring us closer to a much larger proportion of our people than our work heretofore has done, and it is worth our while to prepare ourselves to assume a larger responsibility in operations of this character.

Third—The architect cannot be wholly immune from the effect of changes in business methods in other lines of work akin to his own which have to do with construction; neither can he ignore the value of public recognition and approval of his services. The fact that construction companies and engineering corporations are employing designers and doing all work from the making of plans and specifications to the construction and furnishing of the building, and that this method is increasing along special lines is another element which has the effect of rendering the term architect less known and understood. The prominent part taken by engineering corporations in all Government war work is well known. The reason is evident. The public, even the Government, does not associate the architect with the actual operations of building in the same way they do engineering and construction companies. The element of design is to it an intangible thing and secondary to the building operation, and is considered a part of such operation, if considered at all. The special fields in which these companies operate are those offering the great opportunities to the architect.

These three items, namely:

Instability of prices for material and labor and the consequent rapid change in methods of contractors themselves, by which the contractors are approaching the principal of selling their service, instead of taking a change on profits in the old way, and in which the architect must add greatly to his labor or lose a larger share of control in his work and of the confidence of his client; the impetus given to co-operative and organization methods by war activities; and the assumption by the contracting and engineering organizations of complete control of building from planning to completion and furnishing, are only three items, but sufficient to justify a discussion of our present methods and the advisability of changes in same.

It is the opinion of the chairman of the committee that architects as a class are not assuming the responsibility they should; that there is a wide difference between the appraisal of the service of the architects by themselves and by the general public, and that it is necessary to put a value into their service that will be recognized by a far larger proportion of the general public than obtains at present.

To do this I believe it is necessary for the architect to prepare for and assume a wider responsibility in the actual construction of his building, and a broader initiative in every line of endeavor which has to do with the proper planning and construction of all classes of building, together with the utilities which go to make these buildings complete in service to the community in which they are located. To do this will call for a more complete co-operation of the architects, with specialists in all lines of engineering covering utilities and equipment (and on occasion town planning), required to lay out and equip the work properly. Also, through a department of cost and construction the architect should be prepared to give much closer approxima-

tions to cost of buildings than heretofore, and finally he should be prepared to take over the actual erection of the building in those cases where, on account of location, size of work or any other reason, he feels his client's interests are not fully safeguarded by letting of contracts in the usual way, the owners paying bills for material and labor upon properly audited bills instead of by certificate to contractor as at present.

The objection will be raised that this is contracting and unprofessional. I answer that the subdividing of contracts and building without the general contractor is sanctioned, and I may say favored, by architectural societies to-day, and has been the practice of many architects for years, and is not deemed unprofessional. I confess my inability to see why the purchase of materials and employment of labor by the architect for the few trades furnished by the general contractor, and doing this work for an owner on a fee basis and not for a lump sum with an unknown profit should be unprofessional. The service rendered is one in which the architect adds to his ability to design and his sense of fitness and good taste, a knowledge of building construction and construction operations, which enables him to assume a greater control and responsibility in the execution of his work, and for which he receives a predetermined compensation, not a profit representing the difference between cost and contract price. Work done in this manner is not contracting, but is rendering service for a fixed fee or percentage, and is done in a professional way. At the same time it gives the architect an authority and control of his own work which he rarely has at present, and will give him recognition by the public, which goes usually to the construction organization.

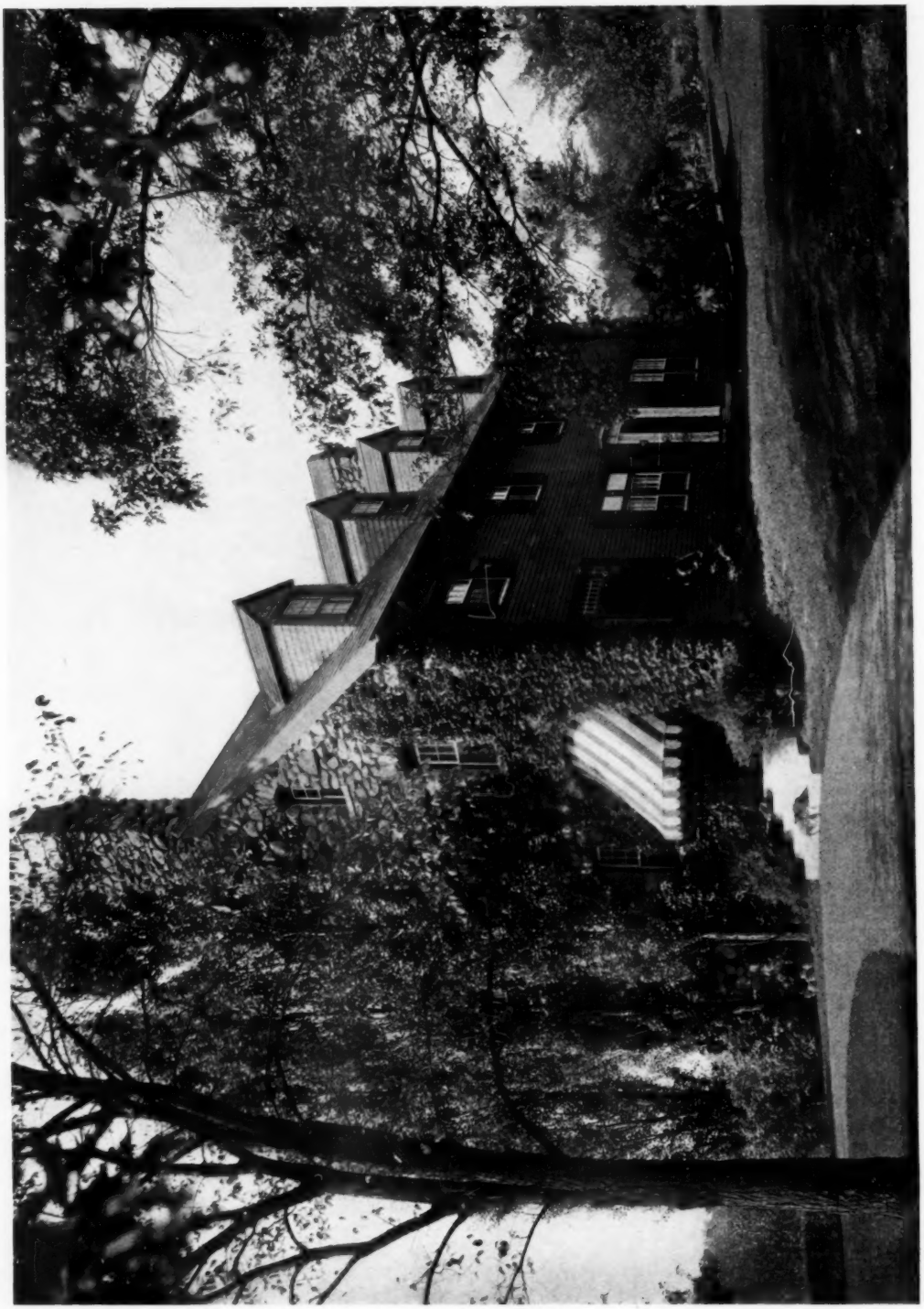
Now I am not unmindful of the general contractor in all of this discussion, and believe that we should co-operate with him as far as we can, fully alive to our clients' interests. There are many cases, however, where circumstances will dictate the elimination of the general contractor, and where to obtain the best results unusual methods should be adopted. In these cases I believe the general contractor will recognize the reasoning as sound and will agree with me.

If architects believe that conditions call for change in methods, and an assumption of a wider responsibility, than the means taken to accomplish that purpose will be modified by the viewpoint of the individual, it becomes the individual's problem. No hard and fast method of procedure can be adopted that will apply to all, but each must work out the matter in accord with his own ideas. Architectural societies to-day control members through rules of practice based on conditions of years ago. They attempt to cover by rule all questions pertaining to practice, but fail for the same reason that the economist fails when he reaches conclusions based on arguments which have not taken into account that element in human nature which seeks change and is not content with things as they are. These rules should be modified and placed on a broader basis, relying more on the individual's sense of honor and fair play.

The State law licensing architects, the revisions of which, in connection with the law licensing structural engineers, is receiving some attention, should be studied with a view to combination. The details of a law which would govern both architects and engineers is a matter for a legislative committee to consider. Under the engineers' law partnerships with architects are permitted. Corporations cannot be licensed, but under the engineers' law corporations are permitted to prepare drawings and specifications for buildings and structures, which are erected, built or their construction supervised by such corporation, provided that the chief executive officer or managing agent of such corporation in Illinois shall be a structural engineer. Architects are barred from incorporating or forming partnerships, except with licensed architects, as far as any provisions to the contrary are found in the architects license law. The legal phases of the question deserve special study. As architects we are barred from doing in a corporate way what we can do as individuals through co-operative methods, as I have tried to suggest. Can we enlarge our sphere of action and be professional? I think we can, as there is not an element of contract in the matter as proposed, except for service rendered in planning and supervising construction of buildings. If the owner desires a guaranteed cost, then the architect must resort to the contractor in the old way, but the architect should employ scientific methods in preparing preliminary costs and make his estimates trustworthy.

My own opinion is that the method outlined is but a modification of methods already employed by architects against whom no charge of non-professionalism has been made. I further believe many cases will be found in practice where better results can be obtained for owner and architect by an adoption of the schemes outlined in lieu of the old.

The details must of necessity be left to the individual architect, but the objective for all can be a larger initiative and control, more co-operation with others working along lines akin to our own, and a more complete service to client and community.



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"Shadows and Straws"

Just at the moment there is some hysteria in the yellow section of the architectural press in the East; there are splenetic outbursts from its fledgling of the Great Lakes. We hear loud calls for the "red-blooded" man, accompanied by frantic appeals for haste, lest the profession be left at the post, in the mad rush, or lest the world take the wrong track through lack of advice from architects. Those who so cry out have no idea of what they wish done, but they insist on the doing of something. "Let us at least make some noise," is the real thought in their minds, for they have observed that most people can be impressed by a drum. But, and very fortunately, these little Hearsts may be dismissed as not counting. To have listened to the discussion in the last meeting of the Board of Directors, when the possibilities ahead of the Post-War Committee were being canvassed, was sufficient evidence to the sixteen men who sat in the room that from one end of this country to the other, thoughtful architects are not jumping to conclusions. Neither are they to be prodded into any futile and hasty action by sneers and snarls. Abundant evidence has accumulated to make it plain that the profession recognizes in the Post-War Committee a serious purpose and a scientific method for the attainment of that purpose.

—From an editorial in the December issue of the Journal of The American Institute of Architects.

ALL of the editorial comment in this issue of the *Journal* appears under the heading "Shadows and Straws."

Which are the shadows, and which are the straws?

Rainbow chasing has, until revived by the editor of the *Journal*, been a lost art. From the classic shades of the Octagon where stalk the ghosts of a time that once was, this editor views the field of architectural practice through glasses dimmed by the accumulated dust of an age that is past and gone. He and only he believes that architects may continue in the future as they did in the past, to pose aesthetically before clients and awe them by the force of their artistic personality.

Apparently it is not known to this Sage of the Octagon that we have been at war, and that we have emerged from it swept clear and clean of all vestiges of feminism. That from now on the practice of architecture will be a man's job. If such a task cannot be visualized by the editor of the *Journal*, perhaps he might find a more congenial field in the pages of the *Ladies' Home Journal*, to which it is known he is a regular contributor.

Naturally a temperament that avoids the rude shocks of actual contact with a man-size job would regard anything so excessively rude as a blunt statement of fact as "yellow journalism." And it is equally true that a mind so delicately poised would shun the vulgar strife of everyday life, and fail to be able to distinguish the real difference between a virile progressive journalism which seeks constructively to bring about needed reforms, and a type of editing whose main distinction is that while it employs many high-sounding words and beautiful metaphors, it says nothing.

If the editor of the *Journal* has specifically in mind a certain "yellow journal in the East, and its fledgling of the Great Lakes" (note the happily turned phrase), why does he not come boldly forth and name these publications? Stalking behind ambiguity is but a certain form of moral cowardice.

State Societies

A MOVEMENT has been set afoot in the Middle West to federate the various state architectural societies which have been so efficiently working for the good of the profession. This is a subject that should receive the favorable consideration of every man affiliated.

In bringing to successful conclusion a matter so important, those engaged in the work—and it will mean an unselfish giving of much valuable time—will be earning the gratitude of their associates and they should receive cordial support and co-operation. There is not, nor can there be, any disloyalty to the American Institute of Architects in favoring the federation of State Societies, or in an effort to secure their formation in every state. There need be no jealousies nor rivalries, except the rivalry in accomplishing the greatest good for the entire profession of architecture.

The Institute does not, as an organized body, represent the entire profession, and in fact does

not number among its members a majority of the practicing architects of this country. It is thus reasonable to assume that the State Societies would secure a sufficient membership in addition, to make the two organizations combined, fully representative.

What we have needed in the past, and have failed to get, is action. We shall need it more in the future. With the friendly but serious competition of two organizations, this action would undoubtedly be forthcoming, and we would witness in our architectural organizations the same conditions that exist in our national politics, the best service by each party as the guarantee of an efficient, result-getting administration.

Sooner or later will the profession of architecture as a complete body be compelled to organize. In its practice it confronts organizations of labor and the various building interests. To assume that it is not necessary to take measures toward its own safety such as are taken by those it is supposed to direct, is to assume a certain dignity which will be the only barrier it can hope to impose between itself and the world.

Certainly we have had sufficient practical illustration as to just what protection this barrier of professional dignity affords, and should take steps to strengthen the profession against the insidious advance of any who would without warrant usurp its functions.

A nation-wide organization of all the profession would secure all of these desirable results, and with the Institute and a group of federated State Societies, we could go steadily forward secure against any encroachment of our prerogatives.

Safety and Sanity

THE large amount of hysteria and pessimistic foreboding now reported in the daily press accents in the most forceful way the contrast between the theorist and the practical man. Just why, in view of the demonstration on the part of this Government in its conduct of the war that the practical idea is the only sure one, will groups of theoretically trained men rush into print with irresponsible forebodings and unreliable predictions?

Every man trained in methods of business and finance sees the new problems, has, in fact, through that very training been able to foresee them, and has set the organization over which he presides in preparation successfully to meet them. These facts have no general publicity. This is regrettable, for they would, if known, tend to reassure the timid ones, misled by theorists as to what the business future has in store.

A certain professor in the New York University sends forth word from the scholastic atmosphere of his study that the not distant future will bring a crisis in business—panic, idle labor, bread lines and riot. What will he personally do to avert these things?

With this man the president of the City Bank takes issue. He sums up in a practical, common-sense way the now all-absorbing factors of demobilization and its effects on labor, the question of the stabilization of prices and other important things affecting readjustment. He sees the dangers, but he also is sure he knows their remedy, and he has set all the machinery of his large organization at work efficiently to prevent all that the professor believes inevitable.

Treating the individual economically, what should be the relative value of these two types of men to the nation? The answer is obvious. Howling calamity at this time is, to a certain degree, as seditious as working treasonably during time of war. The panic that this learned professor believes he can foretell would be the result of a state of public mind brought about by just such utterances on the part of men whom an ignorant public clothes with sapience.

The United States, in its composite aspect has always been a practical nation, hence its steady rise to its present eminence. This feature of good, hard sense is to-day further proved. We did not win this war on theory. Every operation after the first few weeks of indecision was successfully carried forward because it was planned and controlled by practical men.

The best authorities see no cause for great uneasiness over the business future. They do see the grave things that will need careful solution, and they are prepared to deal with them efficiently. There does not appear to be any well-grounded fear for our future business stability.

Criticism and Comment

The Practice of Architecture

The Editors, THE AMERICAN ARCHITECT:

We are in full accord with all five of the paragraphs set forth in the article entitled "The Practice of Architecture" in your issue of Nov. 27. We might add to paragraph 3—"the Architect must be explicit and avoid generalities." This would particularly apply to the specifications where one may frequently see sweeping general clauses requiring the work to be executed by the contractor in a fully complete and finished manner, even though it may not be fully detailed or described in the specifications. Specifications containing such generalities do not indicate thoroughness or efficiency in architectural service, and are not fair either to the contractor, or the client.

SCHENCK & WILLIAMS.

Dayton, Ohio.

The Editors, THE AMERICAN ARCHITECT:

The editorial appearing in the November 27th issue of your journal under the caption of "The Practice of Architecture," containing what might be styled five aphorisms, needs only to be reflected upon to convince those who have hitherto followed the well-beaten path of the practice of architecture that it is necessary, due to the rapid advance of civilization in the last generation, which has so dislodged the firmly rooted professional practices, to recast many obsolete methods and adopt a saner and more practical attitude toward the public who is to be benefited by our services. It must be remembered that at the present time there are many more professions dealing with the construction and equipment of buildings than existed a half century or more ago, and the men who make up the other professions have not been following professional practice handed down from a previous civilization; therein lies the fundamental difference between the professional practice of the architect and his contemporary, the engineer. Nor is the architect to be severely censured for following long standing traditions, for it is inherent in well organized society to adhere to precedent. We see this exemplified very strikingly in court procedure, and it is only natural to suppose that like law, architecture, which has co-existed with it from the beginning of civilization, would be slow to make any radical departure from well-established practices. However, the war has made us all think more intensely, and while some may have foreseen earlier the changes which would inevitably be forced upon the profession as time went on, and ventured to take the initiative even before the war, while the remaining majority adhered to previously established practice, they should not be considered outside the pale of the elect, for as surely as no living thing can persist in the even tenor of its way, while all about it is changing, without suffering from its own inertia, so a profession which is so vitally bound up with the life of a people as is architecture, cannot hope to escape feeling the impress of the age in which it exists.

Hence I am convinced that great good will come out of the criticism and comment regarding the practice of architecture, and that the five points emphasized in your editorial must become the underlying principles for the successful practice of architecture.

EMILE G. PERROT,
Of Ballinger & Perrot.

Philadelphia.

The Editors, THE AMERICAN ARCHITECT:

With reference to the article entitled "The Practice of Architecture," appearing in your issue of November 27, we comment as follows:

So far as paragraph one is concerned, we believe, and have for years, that the business of architecture is inseparable from the profession. Because of our belief that architecture is a business as well as a profession, our firm and other firms have for many years been barred from many architectural societies. It is interesting to us to note that the stars in their courses fight on our side.

So far as paragraph two is concerned, we believe that it is entirely proper for an architect to develop a general demand for his services by reasonable publicity, a practice which we have followed for many years with gratifying results.

As to paragraph three, this firm has for many years given a complete architectural and engineering service, so that we render plans and specifications for everything embraced in the complete equipment and furnishing of industrial enterprises.

We agree to all of paragraph four, except that we doubt the wisdom of holding an architect responsible financially for the cost of an enterprise, since the fee which the architect receives is not large enough to allow him to guarantee his esti-

mates. Should the architect be held financially responsible for the success of an enterprise, he should enter into a contract for carrying it out, and his fee should be large enough to enable him to take financial responsibility. Our firm has never legally agreed that it is financially responsible, but as a matter of practice we have for many years stood behind our enterprises.

Paragraph five has been a cardinal principal of our business for many years. All five of the paragraphs have been endorsed by us and made a part of our business for a long period of time, with the exception of the question of financial responsibility, which we think should only be undertaken by the architect after proper compensation.

Boston. LOCKWOOD, GREENE & Co.

The Editors, THE AMERICAN ARCHITECT:

We appreciate the opportunity to express our opinion as to the statement concerning the practice of architecture appearing in your issue of November 27. Considered as a creed we beg to say that we do not believe in creeds on the average. Creeds breed dogmas and dogmas are time serving and decadence comes after. In this great world of activity the advance guard must be untrammeled of finished things. Leaders of thought must have no creeds to impede their advancement. Creeds are the crucifiers of wisdom. Creeds have only been the formulas for the ignorant by which the hordes are led. Architecture is not a finished article but the most rapidly advancing agency that society has. It would be stultified if its activities were bound up in formulas. Leave the field open for the architect to pound his way upward with daily vigilance and with each new invention his mind can devise independently.

Those in charge of war industries have not admitted any architect to prominence in the recent unpleasantness in the world, nor the name architect to be put forward as a legitimate evidence of accomplishment to occupy any place greater than the awards to conscripts. "Construction Engineers" seems to have been the pet name and some architects got places as such and served admirably. Your creedal expressions apparently admit this error to be a proper idea and would help to abase the name architect. Those of us who know the integrity of our calling do not mind the persecution (or to be more modern, the dirty deal) and are willing to await the consequences with abiding faith undisturbed.

We vastly prefer to see the architectural press turn away from introspection and proceed to fight insults and wrongs committed on the profession, free handed. The field is open now. Our destinies are no longer in the hands of stock brokers and percentage builders. The war is over. The call of patriotism now is not closed lips, but the stroke at those who blaspheme against the institutions of economic industry.

The profession of architecture is the product of necessity and needs no bolster. It is like truth itself—existent—not to be made, but only to be discovered, utilized and amplified.

Atlanta, Ga. EDWARDS & SAYWARD.

Recent Legal Decisions

WORKMEN'S COMPENSATION ACTS—EXTRATERRITORIAL EFFECT

The Colorado Supreme Court holds that where a Colorado contractor employed in Colorado a resident to act as foreman on jobs in a number of states, such employee was protected by the Workmen's Compensation Act while working in another state. This decision is in line with the later opinions of other courts of last resort in states having similarly worded statutes. The facts of this particular case were that a contracting company, organized in Colorado, had a general contract with a telephone and telegraph company for the construction of telephone exchange buildings at different points in the states of Colorado, Wyoming, Idaho, Montana, Utah, Arizona and New Mexico. The employee injured acted as foreman in connection with the construction of these buildings. The court said, in part: "If we assume that there are no workmen's compensation laws in the states where the deceased was to perform his services outside of Colorado, then there can be no recovery of compensation, notwithstanding all premiums sufficient to maintain the workers' accident insurance had been fully paid. On the other hand, if we are to assume that a workmen's compensation law prevails in each of the seven states of Colorado, Wyoming, Idaho, Montana, Utah, Arizona, and New Mexico, then the employer must be compelled to comply with each statute and to pay the premiums required by the law of each state for the protection of the one employee, or approximately seven times the amount otherwise required. If this were

legally permissible, the expense would make it prohibitive. The result in this case must be that: The employer has paid the full premium demanded by the state to insure his employee against accident; the employee has relied on the pledge of his state for the protection of himself and his dependents; his widow and children discover the whole arrangement to be a delusion and a snare, and find themselves without protection." The court refused to assume that the legislature intended such an injustice, in the absence of some clear and express provision in the statute to that effect, which it did not find. It therefore reversed the judgment of the district court vacating the award of compensation of the Industrial Commission, and instructed confirmation of the award.—*Industrial Commission v. Aetna Life Ins. Co. (Colo.)* 174 *Pac.* 589.

Building Restriction Covenants — Open Porches and Enclosed Rooms

The titles to several dwelling houses in a row contained a building restriction that the front of each house should not be nearer than 15 ft. from the street. One of the owners was enjoined in a suit in equity brought against him by his neighbors, where it appeared that he built an addition to his house within the prohibited area, described by the court as follows: "The structure consists of three brick piers 18 in. square, extending as high as the building, which is three stories, and on the two upper stories, supported by the piers, are two open balconies or porches, and on the ground floor there is an inclosure of wood and glass, making a permanent room, connected with the main house, and since its completion is and has been used as a part thereof. This room obstructs light, air, and prospect, and mars the appearance and uniformity of the street, and deprives the plaintiffs of the light, air and prospect, theretofore enjoyed by them." In such a case it was held immaterial that the plaintiffs and the defendant had maintained open porches beyond the 15-ft. building line.—*Law v. Weeter,* 68 *Pa. Superior Ct.* 23.

Accident Not Covered by Contractor's Policy

An owner's contingent policy insured against injuries resulting from the negligence of any contractor or subcontractor engaged in the work. The policy had a schedule: "All work under supervision of James A. Wilson, who lets contract and does carpenter and mason work himself. This policy covers contracted work only." The provision was inserted to bring Wilson within the terms of this owner's policy. One of the contracts was let to a construction company. One of that company's employees injured a passer-by by dropping a plank. The injured person sued Wilson. The insurance company refused to defend the action. Wilson paid the judgment obtained against him by default, and sued the insurance company. It was held that the accident was not covered by the policy. Wilson was not in law liable for the construction company's negligence and there was no reason why he should not have defended the action against him. He could not therefore recover against the insurance company.—*Wilson v. London Guarantee & Accident Co. (Cal.)*

Recovery Although Lien Denied

A mechanic's lien is a cumulative remedy and to deny it does not deprive a party of his right to a recovery upon his contract in the usual way.—*Decatur Bridge Co., v. Standart,* 208 *Ill. App.* 592.

Collusion with Contractor

An architect, like any other professional man, impliedly contracts with his employer that he has the ordinary skill, knowledge and judgment possessed by men of his profession, and that he will use this skill, care and judgment in the interest of his employer and will act with perfect honesty; *Nave v. McGrane,* 19 *Idaho* 111, 119. He is an expert in carpentry, in cements, in mortar, in the strength of materials, in the art of constructing the walls, the floors, the staircases, the roofs, and in duty bound to possess reasonable skill and knowledge as to all these things: *Hubert v. Aitkin,* 15 *Daly* 237, 239. He is responsible for collusion to defraud: *Conn v. Huston,* 16 *Pa. Superior Ct.* 172; and for negligent disregard of his duties; *Lacher v. Colton,* 80 *Ill. App.* 75; and so an owner may be permitted, in an action for services, to show that the plaintiff through collusion allowed the contractor to depart from the plans without the defendant's knowledge or consent, that a loss had resulted and the amount of such loss.—*Henon v. Vernon,* 68 *Pa. Superior Ct.*, 608.

Government to Start Campaign to Promote Building

The final step in preparation for the resumption of building throughout the country has been taken in the promulgation of an order from the Priorities Division of the War Industries Board cancelling all reservations restrictive of the production, sale and use in construction work of building materials.

In addition to the removal of embargoes and restrictions essential during the war period the Federal Government is organizing a campaign to have states, counties and municipalities begin all possible construction at once, in order to furnish work for returned soldiers and sailors, through the United States Employment Service.

The campaign for the nation-wide resumption of building operations was inaugurated in an address on Dec. 30, at a conference of state officials and representatives of labor and industry at Boston by Secretary of Labor William B. Wilson. The campaign will urge an expenditure of $3,000,000,000 for a million new private residences. In addition to private building, Mr. Wilson believes the country will do well to spend $1,000,000,000 on roads and highways and double that amount on other public works.

Newton D. Baker, Secretary of War and chairman of the Council of National Defense, has asked all state defense councils to advance all public improvements in order to absorb labor as far as possible.

A division for the conservation of building operation has been created by the Labor Department and will soon be in operation.

Raw Materials Should Not Be Sacrificed

In an address before the Southern Commercial Congress at Baltimore, Burwell S. Cutler, chief of the Bureau of Foreign and Domestic Commerce, referred as follows to possible liquidation in raw materials:

"We must guard ourselves against motives of fear in the business world. At present most of our factories and storerooms are filled with raw materials and commodities which the owners may be tempted to sell at sacrifice prices in order to restore cash balances wholly depleted by war taxes and purchase of Liberty bonds. Precipitate action of this kind, if based on a fear that raw materials will generally decline in value will bring individual and national loss. The most knowing and deliberate business men realize that the available supply of basic materials for human use and consumption is many times less than the world will need for some years to come. This is the inevitable result of four years of systematic destruction without replenishment in every quarter of the globe."

National Architectural Society Proposed

The President referred to a letter received from Mr. Harry I. Schenck, of the Dayton Chapter, relative to a proposal of the Washington State Society of Architects to call a convention of state societies, not connected with the A. I. A., for the purpose of forming a national body that would be more representative of the profession. Mr. Kohn spoke in favor of a closer affiliation between the Institute and the many loosely organized architectural societies in the country. He said that the four Institute Chapters in New York have considered the formation of a new state association, with a broad membership drawn from the registered architects in the state, who would not necessarily be members of a Chapter or the Institute. It was believed that such an associate class of membership would prove a good recruiting-ground for the Institute. Other directors spoke of the confusion which might arise in the public mind from such a membership and referred to the Chapter associate class which the Institute abolished under its reorganization of two years ago.

Resolved, That the correspondence be referred to the Post-War Committee, with the request of the board that the principle of close affiliation between the Institute and the architectural societies, and its application, be carefully considered.—From the *Journal of the A. I. A.*

Employment of Soldiers

GOVERNMENT AIDS RETURN TO CIVIL LIFE

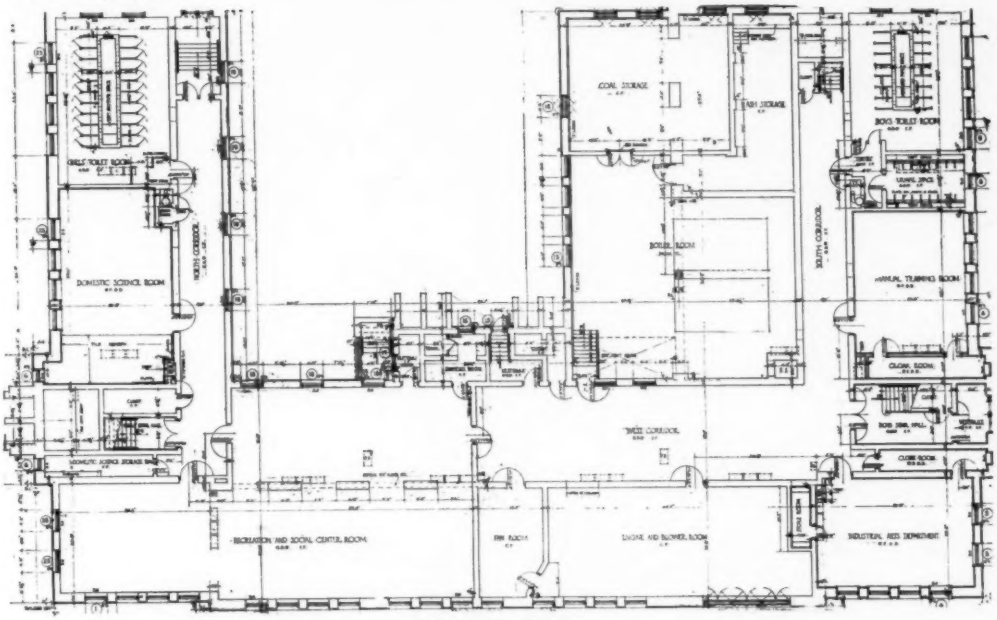
The Federal Board for Vocational Education is distributing two series of pamphlets designed to promote the restoration of soldiers and sailors, both sound and disabled, to gainful occupations in civil life. There are separate pamphlets addressed to the men, to their families and to American employers of labor. Some of the pamphlets tell of a plan of Federal vocational education.

Those wishing to receive information regarding this subject should address the board mentioned above, at Washington, D. C.

PLATE 12

OLIVER WENDELL HOLMES SCHOOL, FIFTY-FIFTH AND CHESTNUT STREETS, PHILADELPHIA, PA.

HORACE COOK, *ARCHITECT*



BASEMENT PLAN

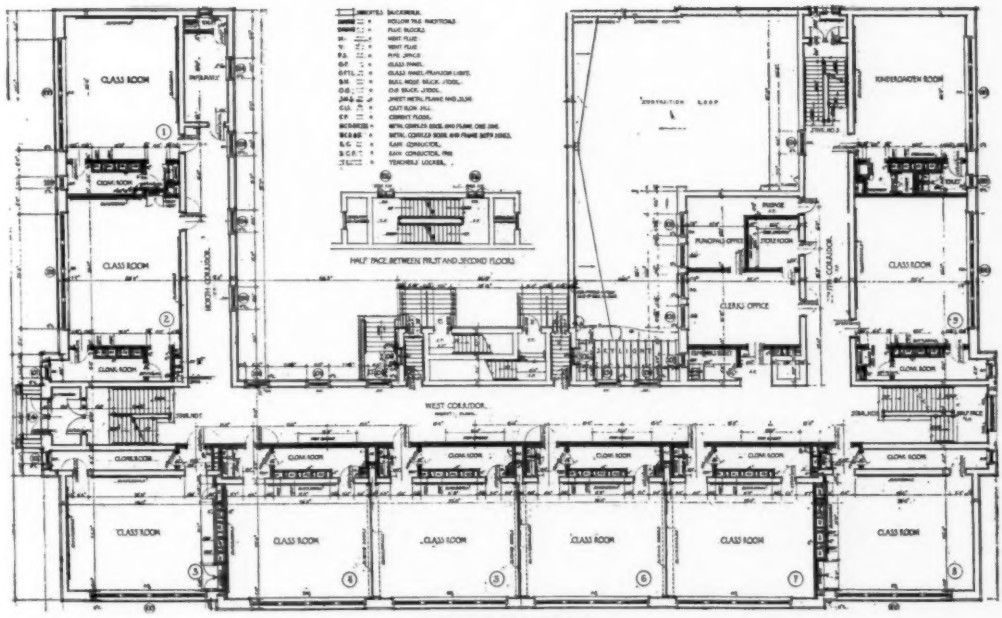


PLATE 13 FIRST FLOOR PLAN .

OLIVER WENDELL HOLMES SCHOOL, FIFTY-FIFTH AND CHESTNUT STREETS, PHILADELPHIA, PA.

HORACE COOK, *ARCHITECT*

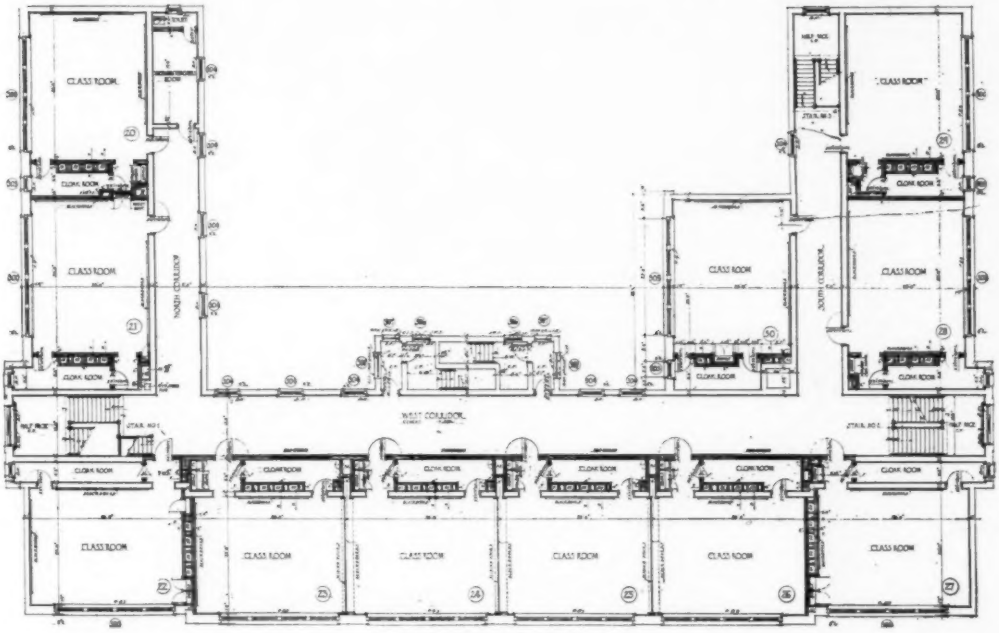

CLASS ROOM
CLOAK ROOM
NORTH CORRIDOR
SOUTH CORRIDOR
WEST CORRIDOR
STAIR NO. 1
STAIR NO. 2
HALF PACE
CLASS ROOM
CLASS ROOM
CLASS ROOM

PLATE 15

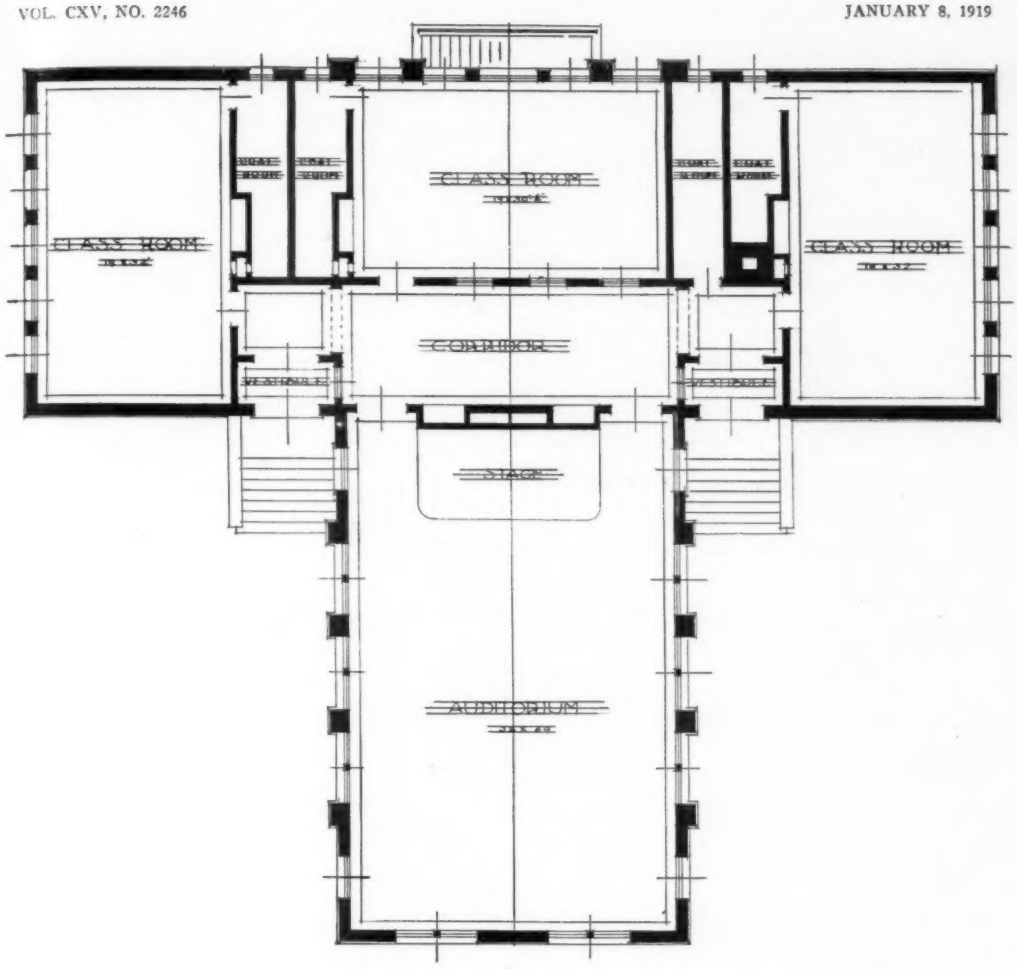
CULLEN SCHOOL, CARDIFF, CAL.

JOHN S. SIEBERT, *ARCHITECT*

PLATE 16

HIGH SCHOOL, LUCY, TENN.

JONES & FURBRINGER, *ARCHITECTS*



HIGH SCHOOL, LUCY, TENN.

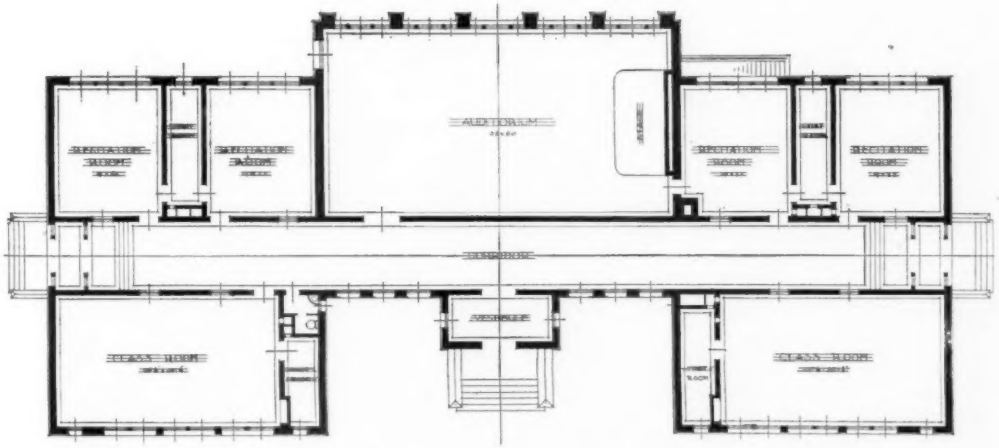


PLATE 17

HIGH SCHOOL, CORDOVA, TENN.

JONES & FURBRINGER, *ARCHITECTS*

The Next Convention of the A. I. A.

The next convention of the American Institute of Architects will be held at Nashville, Tenn., April 30 to May 2, 1919.

It might be noted that in the November issue of the *Journal* containing this announcement, also appears the completed committee assignments of the Institute for the Institute year.

Query: If it required seven months to appoint the Institute committees, how much time should they be given to organize and do effective work?—From the December *Bulletin* of the Illinois Society of Architects.

Landscape Architects Hold Reconstruction Meeting

A special meeting of the American Society of Landscape Architects was held in Washington, D. C., Dec. 7, to consider problems affecting the profession in the reconstruction period.

The meeting was called to consider how the society might best be of service in this country and overseas during the period of readjustment.

Better and more economical results, it was believed, would be secured by the co-operation of landscape architects, as they are likely to be called on more than ever before in the solution of city planning problems.

New York State Board of Registration

There will be two opportunities during 1919 for architects to be admitted to practice in New York State by examination. Examinations held in various cities will be open to candidates who shall have previously qualified, on January 29, February 1, and on June 1 and 3.

Candidates should write at once for information to the Examinations Division, Education Building, Albany, New York. Those who wish to take the examinations will be required by the Regents to qualify under the law, which specifies that the applicant shall have "satisfactorily completed the course in high school approved by the Regents of the University or the equivalent thereof and subsequent thereto of having satisfactorily completed such courses in mathematics, history and one modern language, as are included in the first two years in an institution approved by the Regents, conferring the degree of Bachelor of Arts. Such candidate shall in addition submit satisfactory evidence of at least five years' practical experience in the office or offices of a reputable architect or architects, commencing after the completion of the high school course. * * *"

Candidates may obtain copies of the Registration Law and an outline of the examination by addressing Dr. A. S. Downing, Assistant Commissioner for Higher Education, Education Building, Albany, New York.

Architects who have graduated from certain schools of architecture and those who have practiced ten years in other states may secure certificates of registration without examination. It is illegal for anyone to use the title "architect" in this state without registration unless he actually practiced architecture in New York previous to April 28, 1915. The Board of Examiners and Registration of Architects, Education Building, Albany, N. Y., D. Everett Waid, President; Wm. P. Bannister, Secretary.

To Promote Better Relations Between Native and Foreign-Born Workers

The Bureau of Education, Department of the Interior, is engaged in a movement to promote better relations between native and foreign-born workers in industry. Trade publications reaching employers of labor will help in this service by presenting material in such form that employers can pass it on to their workers by means of the bulletin board, pay envelope, house organ or other medium. The plan is to publish brief articles in the trade publications under such a heading as "Put This on Your Bulletin Board" or one of similar meaning.

Imported Labor Barred

No more Federal permits for the importation of Mexican and West Indian labor will be granted, the Department of Labor has announced, and permits already granted will be void after January 15. Aliens permitted to enter temporarily for war work will be repatriated gradually, without interfering with agricultural or other work now in progress.

The admission of semi-skilled laborers from Canada will be discontinued, but present arrangements whereby skilled laborers are admitted only when they cannot be employed in their own country, and when those countries have given consent to their departure, will be continued for the present. Conferences on this subject are under way between the United States and Canadian Governments.

The Largest Business Unit in the World

Judged by almost any standard the Bureau of War Risk Insurance is probably the largest business unit in the world. In the twelve months just ended the bureau has mailed more than 6,500,000 checks in payment of allowances and allotments, representing a total disbursement of almost $200,000,000 for the care and maintenance of the families and dependents of our army and navy. During the same period the bureau has written nearly $35,000,000,000 of this insurance. The army and navy is more than 90 per cent insured and new applications are now being received for more than $1,000,000,000 of this insurance per week. The bureau has made awards and is paying monthly compensation on more than 5,000 death and disability claims and is paying monthly installments of insurance on more than 9,000 insurance death claims.

In the performance of this threefold task the bureau has within the year handled nearly 3,900,000 insurance applications and more than 3,800,000 allotment and allowance forms, and it has been necessary to prepare and maintain under constant control more than 26,000,000 separate individual card records. The bureau has received and answered more than 3,000,000 letters. From a small organization of twenty persons working in the basement of the Treasury Department, the bureau has grown until now it has a working force of 13,000 employees occupying thirteen buildings in Washington.—*Heating and Ventilating Magazine.*

Oldest Iron Industry

The Shansi iron industry is claimed by a Chinese writer to be the oldest in the world, says *Domestic Engineering*. Like many others of the great resources of China the country's deposits of iron ore have been but little developed. Dr. H. Foster Bain, assistant director of the United States Bureau of Mines, who spent some time in China investigating its mineral resources, estimates that China has 400,000,000 tons of iron ore available and suitable for modern furnace reaction and an additional 300,000,000 tons that might be treated by native methods.

The iron ore deposits are now controlled by Chinese or Japanese interests, the Chinese Government aiming to control those that are not already mortgaged to Japanese interests. The Penchihu furnaces were producing in 1918 about 75,000 tons of pig iron. The Anshanchan Iron Works, in Manchuria, operated by the South Manchuria Railway, have an annual output of 150,000 tons. The Hanyehping furnaces are probably producing an equal amount, which will be increased when the company's furnaces are in operation at Tayeh. Thus, a fair estimate of China's production of pig iron (1918) would seem to be about 500,000 tons a year, including the output of numerous crude native furnaces, about 50 per cent of which are said to be in Shansi. The Hanyehping Co. took out, in 1917, 540,000 tons of iron ore.

During 1917 China exported to Japan 170,000 tons of pig iron, valued at 5,300,000 taels, and 303,500 tons of iron ore, valued at 1,000,000 taels. One tael is equal to about $1 in United States currency.

Decay in Buildings

Research was recently started by the Forest Products Laboratory to determine the "killing points" in temperature and humidity of common fungi found in American buildings. Field and laboratory studies indicate that much more care should be exercised in the selection of timber and in the construction of buildings to avoid conditions favorable to decay. A number of inspections of buildings which have given trouble on account of decay have shown that any one of the following causes may result in rapid deterioration of the building:

1. The use of green timber.

2. Allowing timber to get wet during construction.

3. Allowing the timber to absorb moisture after the building is finished because of leaks or lack of ventilation.

4. The use of timbers containing too much sapwood.

5. The use of timbers which have already started to decay.

The avoidance of these conditions will, as a rule, it is said, prevent decay. In special cases, however, decay can only be prevented by preservative treatment. It is stated that for this purpose salts, such as zinc chloride and sodium fluoride, are better than creosote for buildings.

Purple Wood from Panama

Large growths of bright purple nazarene wood are lying idle in Panama, only awaiting development, according to Dr. Henry Pittier, who recently led a botanical expedition to the Darien section of the Isthmus. Before the war this beautiful wood commanded $125 to $200 per thousand feet. It is

estimated that there are 40,000,000 feet of wood awaiting use.

This timber has most unusual qualities. The trees reach a large size, sometimes a diameter of three feet, and have very little sap wood. The interior is a rich purple color and the wood is hard, heavy, strong and extremely resistant to water and weather; it contains an essential oil and it takes an excellent polish. When the wood ages, and is at the same time exposed to the sunlight, it turns much darker in color.

Importance of Community Boards

GREAT TASK REQUIRES SYSTEMATIZED EFFORT

There is no instrumentality at the Government's disposal so well equipped to help in the process of transition from a war to a peace basis as the Community Labor Board, and at no time since the beginning of the war has the need of such service been more urgent or the duties imposed upon those capable of performing them more imperative.

The country now faces the obligation to return to suitable employment those who, under the stress of war, it has induced to enter its service in the field or in the factory. The demands upon the country since the signing of the armistice are, perhaps, greater than those during the war, and the Community Labor Board will be looked to, largely, for the successful handling of the new problem.

The activities of the Community Board, by means of which workers in non-war work have been recruited for war industry, will now be utilized in the replacement in industry of both soldiers and civilian war workers. The board will be used to gather information in industrial localities necessary to an intelligent demobilization of the army and war industry and the redistribution of workers. A plan has been formulated by the War Department and the War Industries Board whereby the Community Labor Board in the important industrial centers will send weekly reports to the latter indicating the labor conditions in their communities.

Secretary of Labor Wilson has sent an appeal to each of the sixteen hundred boards now in existence urging their members to continue in the work until the last unit of our fighting forces overseas shall have been brought back to appropriate pursuits of peace, and the last man to be withdrawn from war service shall have been given an opportunity of employment where he is best fitted to serve.

Work of the United States Employment Service

With the co-operation of the national welfare organizations, the Government agencies interested in demobilization, and local community organizations of all kinds, the United States Employment Service is establishing a Bureau for Returning Soldiers, Sailors, and War Workers in every city and town in the United States. It also has stationed qualified representatives in all army camps and posts in this country to acquaint soldiers with the facilities for assisting them to suitable employment after they leave camp.

The reconstruction program of the Employment Service links up all national and local efforts, both governmental and private, and centralizes in every community, through these local bureaus, all information as to proper openings in industry, commerce, and agriculture available to the nation's fighters and war workers. It calls for assisting them to the best work the country can give them, the individual's qualifications being considered, and for sending as many men as possible to the farms.

Since most soldiers are expected to go to their home communities—and should be encouraged to do so—the task of aiding them in finding work is primarily a community responsibility, and the local bureaus enable its discharge.

The program has been approved and adopted by the Secretaries of the War, Navy, Interior, Commerce, Agriculture, and Labor Department, sitting as the members of the Council of National Defense. In the same capacity, those cabinet officials most concerned with demobilization have taken steps to keep intact the field machinery of the defense council so that it may be utilized by the Department of Labor and its Employment Service in carrying out the replacement program. Their action brings to the Employment Service's aid a total of 184,000 local units, among them being the State councils, 4,000 community councils, and 16,000 women's organizations.

County Organizations for Forest Fire Control

Twenty-four counties in California have adopted a plan of organization for rural fire control, states *Engineering News-Record.* In these counties, covering 16,000 square miles, 412 rural fire-fighting companies have been organized and now include about 6,500 men, according to a summary of the situation recently made by the University of California. By the aid of 532 automobile trailers,

which have been purchased and equipped with fire extinguishers and fire-fighting tools at county expense, these companies have kept losses from fire at a remarkably low figure in the past season.

Results of Daylight Saving Law

According to the United States Fuel Administration's estimates, 1,125,000 tons of coal were saved by turning the clocks ahead one hour for seven months. Definite reports from St. Louis show a saving of 17.5 tons for each thousand of population on the seven months' basis.

The saving in France for a three months' period was 250,000 tons, which would make a saving of 12.5 tons for each thousand of population for a seven months' period.—*Heating and Ventilating Magazine.*

Her Roads Saved France

And why has it been possible for France to carry on for four years a successful war against the greatest military power that the world has ever seen? Because France had the benefit of the engineering skill and of the foresight of two men who are 1,800 years apart—Napoleon and Caesar. Those men built the roads of France. Without those roads, conceived and built originally by Caesar for the conquest of the Gauls and for the conquest of the Teutons, without the roads built by Napoleon to stand off the enemies of France, and to make aggressions to the eastward, Paris would have fallen at least two years ago. So that you gentlemen who are engaged in the business of developing the highways of the country, and putting them to greater use may properly conceive of yourselves as engaged in a very far-sighted, important bit of statesmanship, work that does not have its only concern as to the farmer of this country, or the helping of freight movement during this winter alone, but may have consequences that will extend throughout the centuries. Take the instance of Verdun. Verdun would have fallen unquestionably if it had not been for the roads that Napoleon constructed and that France has maintained; for all the credit is not to go to the man who conceived and the men who constructed. This is one thing where we have been short always. One thing that the people of the United States do not realize. It is not sufficient to pay $25,000 a mile for a concrete foundation, but you must put aside 10 cents out of every dollar for the maintenance of these roads, or your money has gone to waste and your conception is idle. And you gentlemen know if you continue, as I hope you will, after the war you will have not merely a function in the securing of the building of good roads, but will have a very great function in the maintaining of these roads as actual arteries in the system of transportation of the country. You remember that at Verdun the railroad was cut off, and Verdun was supported by the fact that she had trucks which could go 40 feet apart all night long over the great highway that had been built from Paris to the East.—*Franklin K. Lane, Secretary of the Interior, before the conference of regional chairmen, Highways Transport Committee.*

Professor Goodyear's Research

The Brooklyn Museum recently exhibited two groups of Prof. William H. Goodyear's enlarged photographs of cathedrals in the war zone of Europe. When the photographs were made there was no thought of war. They were made with exceeding care to illustrate deviations from the normal of lines in medieval buildings, to illustrate and prove Professor Goodyear's discoveries that lines assumed to be vertical were not so but were bent from the perpendicular, that lines assumed to be horizontal and straight were bent or curved either in the horizontal or vertical plane. Most of the pictures include simultaneously photographed plumb-lines or stretched lines to show the deviations. As most of the buildings photographed have been in the path of *kultur* to a greater or less degree, and are now either badly damaged or entirely destroyed, these accurate, painstaking photographic records, many of them showing details which the ordinary tourist or even student would probably never even see, form a heritage for which the world, and especially the architects, owe Professor Goodyear the deepest gratitude. To indicate the care and thoroughness with which the work has been done, it is well to note that there are some cases where every pier of the nave has been individually photographed with plumb-line reference. These records are now priceless, for as Professor Goodyear has pointed out, not even elaborate monographs and measured drawings of these buildings have made serious note of the refinements and deviations which exist.

Nor are these enlargements valuable only as records. Many of them are noteworthy pictorially and merely for the sake of having good pictures of the best architecture of the Middle Ages. Pictures taken from the architect's viewpoint, we should be thankful that these splendid Goodyear negatives are in existence and in the care of the Brooklyn Museum.—Ben J. Lubschez in the December *Journal of the A. I. A.*

Department of Architectural Engineering

Useless Waste in Concrete Construction Due to Legal Requirements*

By W. Stuart Tait, *Assoc. M. Am. Soc. C. E., Assoc. Mem. Inst. C. E.*

Correctness of Design and Analytical Methods

THE second general heading to be considered in arriving at the factor of safety may be roughly classified as correctness of design and analytical methods. The various building codes set down the analytical method to be followed in preparing all designs. In considering beam or one-way slab, for instance, we find that most building codes provide that for uniformly distributed loads the bending moment $WL/8$ shall be used where the beam is of one span length only. Where a beam is partly continuous, that is to say, more than one span in length, a positive moment of $WL/10$ is required to be figured at the center of the end spans, and in the Chicago ordinance a moment over the supports is to be taken as not less than $WL/18$, and the sum of the moments over one support and the center of the span shall be not less than $WL/6$, W in all cases being the total uniformly distributed load on the beam and L the center-to-center span. For intermediate spans the bending moments for a uniformly distributed load, both positive and negative, are to be figured as $WL/12$. The table (Fig. 4) shows the bending moments for beams having knife edge supports at both the end and intermediate points. These bending moments, of course, are based on all spans being uniformly loaded and upon all spans being equal. The bending moment $WL/12$ now in general use for intermediate spans was fixed to cover the worst conditions of bending possible, due to some of the spans being loaded while others were not loaded. By comparing the bending moment requirements governed by ordinance and accepted in engineering practice, however, with those shown in the diagram, it will be observed that standard practice lays far greater stress on the positive moment than on the negative moment, while with uniform conditions of loading the negative moment is far greater and more important than the

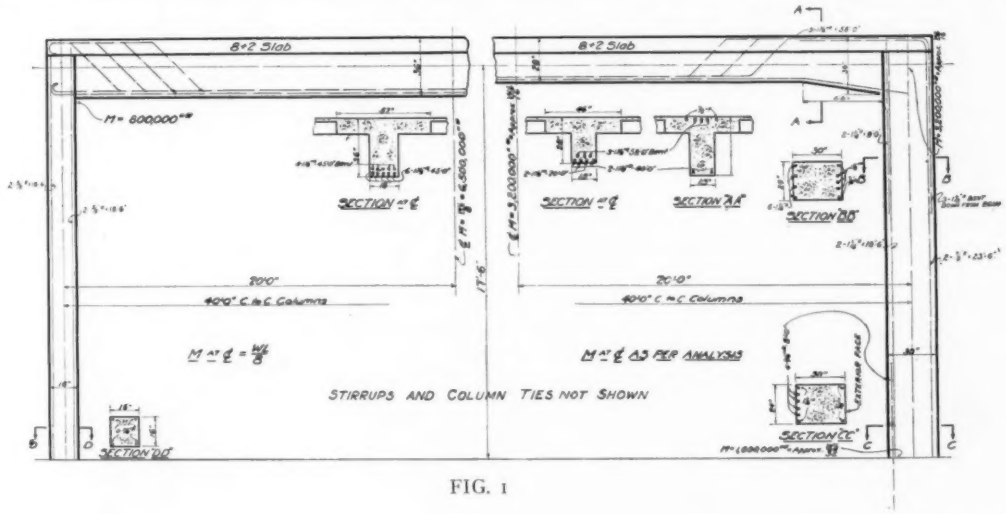


FIG. 1

*Continued from our issues of December 11 and 18, 1918, pages 718 and 752.

positive moment, and in this respect standard practice and all building codes tend to produce structures which are inclined to be weak in negative bending. Take, for instance, the case of a beam two spans in length resting on brick walls. How many practicing engineers design for a negative moment over the center support of $WL/8$? The Chicago ordinance could be satisfied on this point by providing a bending moment of $WL/15$, while

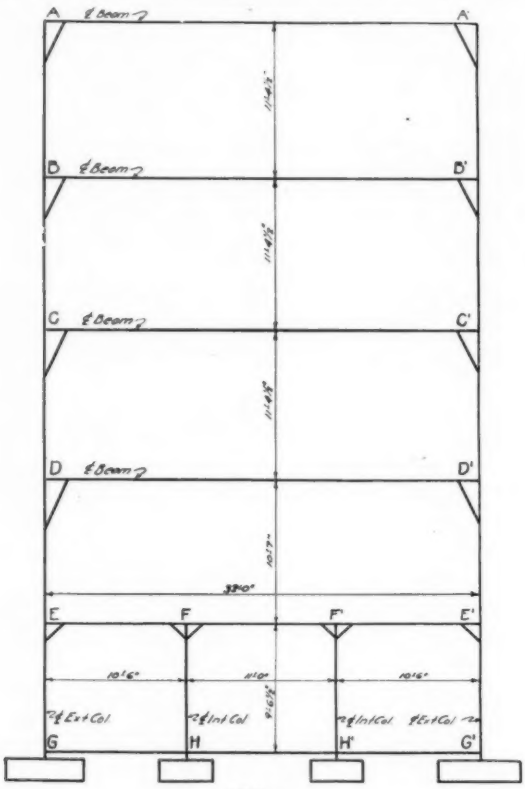


FIG. 2

the positive moment used would have to be $WL/10$, against a possible correct value of $WL/14$. Some years ago it was the opinion of many engineers that so long as sufficient positive resisting moment was provided that this resisting moment would provide the necessary strength and relieve the negative stresses. More recent experience and investigations, however, have demonstrated that this is not the case. The distribution of the total bending moment between the positive and negative is governed partly by the distribution of load and partly by the relative moments of inertia of the member at the center and at the support. It is also, of course, affected to a marked degree by the condition of fixity of the supports. I feel that it is not out of place here to also call attention to the fact that the dead and live load moments are always, in American practice, treated together. In some cases this adds a severe and entirely unnecessary burden on the construction.

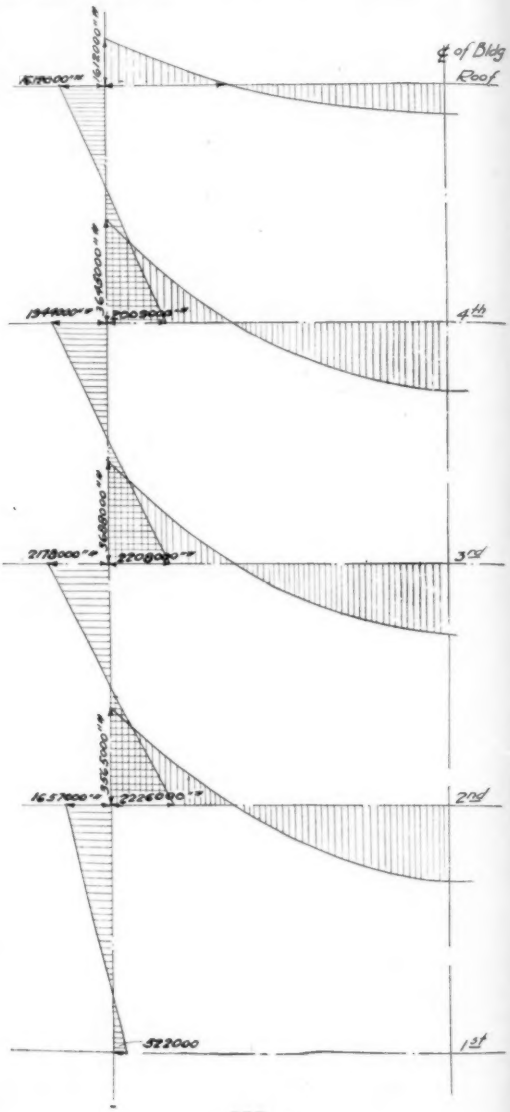


FIG. 3

The rules for figuring the bending moment in beams and slabs as given above were sufficiently accurate for concrete designing as practiced ten or fifteen years ago, but now that we have a large body of trained concrete designers it would appear that this "rule of thumb" method places upon the investor an entirely unnecessary financial burden,

while in some points his building is not as strong as he and his designers believe if they follow the building ordinance and accepted practice literally. In arguing for the accepted practice of bending moments mentioned above, their advocates seem to lose sight of the fact that there are a number of actual conditions tending to reduce the maximum bending moment possible due to irregular load. Anyone who has assisted in or witnessed one of the scientific load tests on actual buildings where the stresses were measured by extensometers, have had forcibly brought before them the fact that it is extremely difficult to load a floor to any considerable extent and avoid to any degree arch action in the load itself. This arch action in the load itself, of course, reduces the positive bending moment, but does not affect the shear at the supports. Another factor contributing in beam or slab strength to a marked degree is the arch action in the beam or slab itself. Another fact also contributing is that concrete, while engineering practice does not recognize it, has a material strength in tension. Text books, of course, show that this strength is not a reliable or important item, but actual tests seem to indicate that it contributes materially to the strength of concrete construction. These three strength contributions mentioned all tend to a marked extent to assist the beam or slab in overcoming the extreme bending moments resulting from unequal load, and it would seem only fair to make some allowance for these assisting factors in determining the actual bending moments to be figured.

The bulk of concrete construction is built with exterior columns. Of course, there is a material amount of construction in which brick-bearing walls are used. It would seem incorrect to treat these two classes of construction under precisely the same regulations. Where concrete columns are used in the outside walls the connection between the beam and the column is not hinged, as is assumed in all building regulations, but is rigidly fixed. This fixity causes a negative bending moment in the beam adjacent to the column, and produces a bending moment in the column itself. This negative resisting moment produced by this fixity reduces the positive bending moment in the exterior spans to a very marked degree. The latest text books on reinforced concrete design give clear and correct methods for calculating the bending moment caused by this fixity, and the time has therefore passed when we should, as a matter of convenience, or as an admission of lack of knowledge, treat this end connection as if it was hinged. On account of the erroneous assumption made in the preparation of

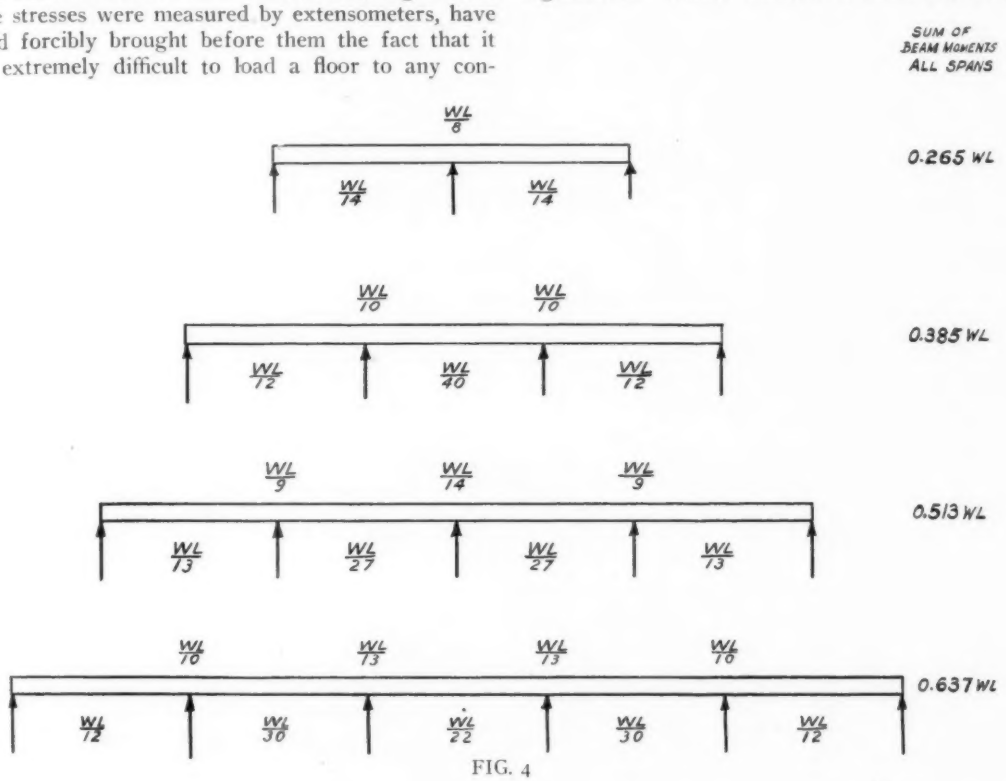


FIG. 4

all building ordinances that the connection between a concrete column and beam is hinged and not fixed, no recognition was given to the fact that the rigidity of the connection between the column and the beam to a marked degree prevents the occurrence of the high positive bending moments we have established to provide for some or all of the spans of a continuous beam being loaded. If one interior span in a beam continuous over a number of supports is loaded and the adjoining spans are not loaded, the rigid connection between the beam and the column brings into play the bending resistance of the column itself, both above and below the beam, with the result that the maximum theoretical bending moment at the center of the loaded span is reduced. In considering a concrete slab continuous over a number of concrete beams a similar resisting strength is contributed by the ability of the concrete beam to resist torsion.

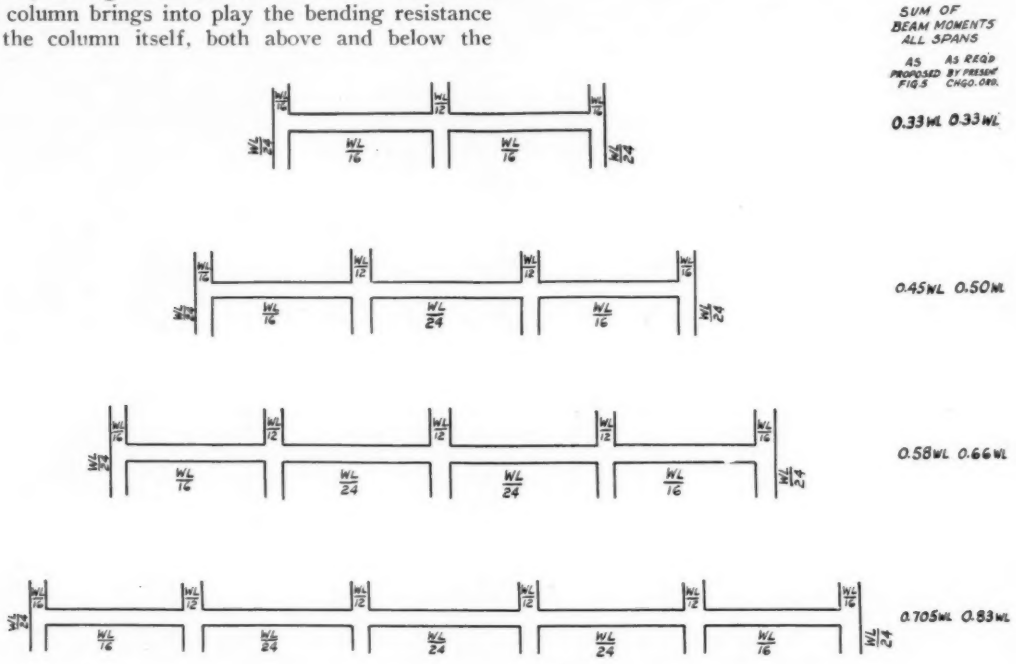

SUM OF BEAM MOMENTS ALL SPANS
45 AS REQ'D PROPOSED BY PRESENT FIG. 5 CHGO. ORD.
0.33WL 0.33WL
0.45WL 0.50WL
0.58WL 0.66WL
0.705WL 0.83WL
TOP STORY COLS. TO BE FIGURED FOR A B.M. OF WL/16 INSTEAD OF WL/24

FIG. 5

In the long span concrete construction such as is being put into execution in these times serious defects may develop from treating this end connection in the old-fashioned manner. The writer had occasion recently to design some concrete girders having a span of 60 ft. Before doing so he took up with the architectural engineer of the building department in the city where these beams were to be erected the matter of their design. He proposed to the building department that they should be designed as fixed beams and the columns properly proportioned to resist the bending moment actually occurring. The building department ruled that their hands in the matter were entirely tied by the ordinance, since in single span construction, such as this, the ordinance provided that the bending moment at the center of the beam should be figured as *WL/8*. The writer then asked if the building department would require the column to be designed for a direct load only. Their decision was that that was what the ordinance demanded, and that the same would be satisfactory. Since, in this case, the structure was only one story in height, the columns supporting the end of this beam could be relatively slender, and on account of the fixed condition of the end of the beam the columns would be subjected to a bending moment which would highly overstress the column. The illustration (Fig. 1) shows at the left the half elevation of a long-span concrete beam and column of this class which would satisfy most building codes. At the right on the same illustration is shown the beam and column carefully designed to act as a rigid frame. The cost of these two structures is practically the same, yet in one case we have a properly balanced design and in the other a design which is

very weak. It will be noticed that the actual bending moment occurring at the middle of this beam is approximately *WL/16* instead of *WL/8*, as required by the ordinance, and still the structure which is unacceptable under existing building ordinances is actually stronger than the structure that would receive the approval of most building departments. Some people may ask why it is that this condition has not resulted in serious failures in the past. The answer to this is simply that up to a short time ago, when structural steel became such a scarce and high-priced commodity, for long-span construction the designer naturally turned to structural steel. In shorter span construction the bending moment occurring in the column was, of course, very materially less numerically in value on account of the fact that it varied with the square of the beam span. The size of column supporting the end of the beam, however, as in the case illustrated in the design above, would be governed by the minimum requirement for column dimension on account of its length. Suppose, for instance, that the span in the example had been 20 ft. instead of 40 ft., the bending moment in the column would have been reduced to about 200,000 in.-lb. instead of 800,000 in.-lb., while the column supporting the end of the beam would remain as shown, 16 in. square, since the minimum dimension of the column was governed by its length, and was thereby fixed at 16 in. It would seem, in view of these facts, that where the designer of a structure is willing to expend the time and thought necessary to prepare a design in which the actual bending moments are determined by a method such as that known as the method of Slopes and Deflections, that building departments should be in a position to recognize the benefits of having structures erected from properly balanced designs. Their present attitude forces upon the competent and conscientious engineer the necessity of designing as in the case cited for a bending moment at the center of the beam of *WL/8* instead of *WL/16*, while at the same time strengthening the exterior column to resist the actual bending moment determined from the relative stiffnesses of the beam and column which he has found necessary to use.

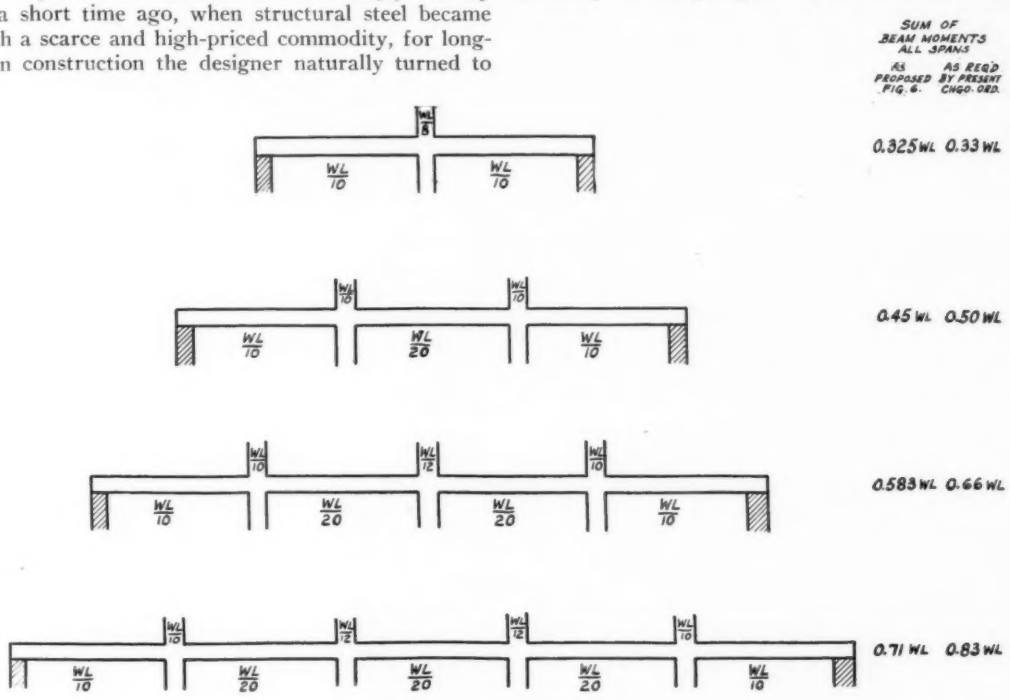

SUM OF BEAM MOMENTS ALL SPANS
AS PROPOSED FIG. 6.
AS REQD BY PRESENT CHGO. ORD.
0.325 WL 0.33 WL
0.45 WL 0.50 WL
0.583 WL 0.66 WL
0.71 WL 0.83 WL

FIG. 6. WALL BEARING

About a year ago the writer had occasion to design a multiple-story structure, which was to be erected in a small community outside of the jurisdiction of an established building department. This structure was one span only in width, the columns being placed 32 ft. center to center. The diagram (Fig. 2) shows a cross-section of this structure in outline. The diagram (Fig. 3) illustrates the bending moments occurring in the various beams and supporting columns. I would like to draw attention to the fact that the maximum positive bend-

ing moment at the center of this span was $WL/19$ while the maximum bending moment at the support was $WL/13.5$. The largest bending moment found in a column was $WL/22$. In all of these bending moment figures W equals the total distributed load on the beam and L the center to center span of the same. The maximum bending moments given above were obtained by considering some or all of the floors fully loaded. The erection of this structure, as designed, would not have been possible under existing building codes, and had it been erected in concrete the sizes of the beams spanning across this building would have been increased enormously. As a result this would have added a considerable item of cost to the construction, and the structure would not have been one whit more valuable so far as the manufacturer who occupies it was concerned.

Most engineers and architects recognize that skeleton construction of reinforced concrete in which the exterior columns are replaced by brick walls is very much more uncertain and less satisfactory than where a complete skeleton having exterior columns is used. Few designers proportion their footings on the basis of the dead load or on the dead load plus a small portion of the live load. The general practice is to design the foundation both for outside walls and interior columns for the same bearing pressure, using both the dead and a large proportion of the designed live load occurring in each location. In all foundations, except rock, shale or solid gravel, some settlement is certain to occur, and if the bearing pressure on the underside of footings proportioned as above is taken at the same value for both the exterior walls and the interior columns, a much higher actual pressure will probably be developed at the exterior than at the interior footings. This condition will exist during the period before the building is occupied and loaded, and also at those times when the interior of the structure is not completely loaded to the design strength of the floors. In many cases this has lead to a greater settlement of the outside walls than of the interior portions of the structure. This settlement, of course, means that the outside end of the exterior beams will be bent downward, and in concrete construction a high negative bending moment over the first row of interior columns will be produced. In mill construction this is not the case, since the end floor girder resting on the wall and on the first interior column is somewhat free to move. If the exterior supports of the structure are brick-bearing walls, four or five stories in height, they will, of course, be very much heavier than 13-in. spandrel walls and columns, and on the basis of foundation design outlined the tendency of the walls to settle is intensified. It would appear, therefore, that building ordinances would do well to make more favorable rulings for bending moments in concrete beams supported on exterior columns, with the idea of stimulating designers to use exterior columns. I would suggest that building codes establish two tables of bending moments somewhat similar to those given, Figs. 5 and 6, the former table applying for building skeleton construction where the exterior columns were designed to take bending, and the latter for the case of structures having no exterior columns.

I wish to emphasize the importance of considering and providing properly for the negative bending moment in reinforced concrete construction. Numerous engineers pay little attention to this point, and building departments, many of them, unwittingly approved designs in which the extreme fiber stress in a beam resulting from negative bending may run as high as 1500 lb. per square inch where the ordinance allowance may only be 800 lb., and, as will be observed from the illustrations in this article, the negative bending moment is always more serious than the positive.

With the bulk of reinforced concrete design now being executed by thoroughly competent and experienced professional organizations, it is unnecessary for building codes to carry as high a factor of safety as was necessary under the old régime of ten years ago, when most concrete designing was carried out in commercial offices. Our engineering colleges have, in the past ten years, produced a large number of engineers versed in the theory of concrete design, many of whom, after a few years' experience, develop into excellent designers. Engineers of this class, of course, were practically unobtainable ten years ago, and those practicing and directing the design of concrete construction had neither through experience nor education learned where the danger points lay nor were they in a position to systematize the work of their designing and detailing forces with the object of covering with accuracy the numerous secondary points in concrete designing and detailing which is so essential.

In a later article the writer hopes to propose a method of insuring better concrete construction, and to thereby secure from building departments recognition that good concrete design properly carried out under to-day's standards carries an excessive factor of safety. With the safeguards which the writer hopes to propose later it would be entirely unnecessary to provide any quantity in the factor of safety to allow for incorrect analytical methods or to provide for errors of design.

(To be continued)

Effect of Time of Mixing on the Strength of Concrete*

By Prof. Duff A. Abrams

Structural Materials Research Laboratory, Lewis Institute, Chicago

Part IV

TABLE 4

A STUDY OF THE TIME OF MIXING CONCRETE—(SERIES 89)

(Effect of Consistency)

Mix 1-4 by volume.

Aggregate sand and pebbles graded up to 1¼ inch in size.
Compression tests made on 6 by 12-in. cylinders.

Wear tests made in Talbot-Jones rattler; specimens consisted of concrete blocks 8 by 8 by 5 in. thick; 10 wear blocks in a ring were run for 1800 revolutions at 30 r.p.m., with a charge of 200 lb. cast iron shot.

Cylinders stored in damp sand; tested damp. Wear blocks stored in damp sand until 2 days prior to test.

Ref. No.	Time of Mixing, Min.	Tests of 6 by 12-In. Cylinders: Compressive Strength: Lb. per Sq. In. 7d.	28d.	2m.	Mean Error, per Cent 7d.	28d.	2m.	Av.	Weight, Lb. per Cu. Ft.	Density	Yield	Wear Tests at 2 Months: Depth of Wear, Ins.	Mean Error, per Cent
Relative Consistency 90%—Water .655 of Volume of Cement													
1	10	2510	4370	4660	1.9	2.0	4.1	2.7	158.0	.871	1.036	.46	10.2
2	5	2230	4020	4520	4..	7.9	4.0	5.4	158.0	.871	1.036	.48	4.0
3	2	1740	3440	4060	1.2	9.9	15.3	8.8	157.5	.868	1.040	.56	6.0
4	1	1840	3750	4130	9.2	5.2	12.5	9.0	157.5	.868	1.040	.60	8.4
5	½	1620	3180	4190	8.0	8.6	7.4	8.0	156.0	.860	1.049	.52	7.9
6	¼	1260	2140	2880	31.4	32.0	20.5	28.0	153.0	.844	1.070	.69	19.9
Average		1870	3480	4070	9.3	10.9	10.6	10.3	157.0	.864	1.045	.55	9.4
Relative Consistency 100%—Water .725 of Volume of Cement													
7	10	1640	2930	3960	4.0	3.5	7.5	5.0	156.0	.856	1.055	.49	16.9
8	5	1750	3520	3810	3.2	4.0	20.4	9.2	156.5	.857	1.052	.57	9.0
9	2	1460	2800	3500	5.0	4.6	8.2	5.9	156.0	.856	1.055	.53	5.7
10	1	1380	2780	3620	5.7	4.2	9.8	6.6	156.0	.856	1.055	.53	5.7
11	½	1130	2210	3080	5.7	7.6	6.7	6.7	155.0	.851	1.061	.72	8.3
12	¼	1000	2020	2860	22.6	19.3	9.2	17.0	153.0	.839	1.077	.93	20.2
Average		1390	2710	3470	7.7	7.2	10.3	8.4	155.4	.852	1.059	.63	11.0
Relative Consistency 110%—Water .800 of Volume of Cement													
13	10	1520	2860	3640	12.8	12.5	8.5	11.3	156.5	.852	1.062	.60	7.2
14	5	1500	2900	3550	6.4	3.6	7.8	5.9	156.5	.852	1.062	.64	7.4
15	2	1090	2300	3070	14.2	11.4	7.2	10.9	155.5	.845	1.068	.60	5.4
16	1	1160	2520	3350	4.9	8.8	5.9	6.5	155.5	.845	1.068	.66	8.9
17	½	880	2060	2620	24.1	16.2	13.0	17.8	154.5	.842	1.074	.76	25.5
18	¼	1060	2140	2790	21.4	28.0	22.6	24.0	153.0	.834	1.086	.70	16.0
Average		1200	2460	3170	14.0	13.4	10.8	12.7	155.2	.845	1.070	.66	11.7
Relative Consistency 125%—Water .910 of Volume of Cement													
19	10	1260	2140	2980	.9	14.5	13.1	9.5	154.5	.833	1.084	.69	11.6
20	5	1200	2170	3030	7.6	15.5	4.6	9.2	155.0	.835	1.081	.68	11.5
21	2	1030	1800	2500	14.1	7.8	12.0	11.3	153.5	.827	1.091	.61	13.0
22	1	900	1830	2250	9.9	8.6	16.8	11.8	153.5	.827	1.091	.63	4.5
23	½	710	1640	2400	17.8	22.9	5.8	15.5	154.0	.830	1.088	.69	8.7
24	¼	690	1510	2250	25.0	44.6	42.5	37.4	153.0	.825	1.095	.98	27.6
Average		960	1850	2570	12.6	19.0	15.8	15.8	153.9	.830	1.088	.71	12.8
Relative Consistency 150%—Water 1.080 of Volume of Cement													
25	10	690	1240	1820	5.4	9.0	7.4	7.3	153.0	.810	1.115	.85	9.4
26	5	560	1090	1780	12.1	21.6	5.6	13.1	152.5	.808	1.118	.92	12.7
27	2	480	1030	1750	9.3	8.5	6.1	8.0	153.5	.814	1.110	.78	20.5
28	1	500	1090	1740	12.1	9.2	8.8	10.0	152.5	.808	1.118	1.06	17.4
29	½	500	1120	1690	4.2	17.2	12.9	11.4	152.0	.806	1.120	1.19	8.4
30	¼	340	880	1200	29.0	36.2	21.7	29.0	151.5	.803	1.125	1.46	2.4
Average		510	1080	1660	12.0	17.0	10.4	13.1	152.5	.808	1.118	1.04	11.8
Relative Consistency 200%—Water 1.4[illegible]0 of Volume of Cement													
31	10	260	620	1110	26.9	31.8	28.4	29.0	149.0	.764	1.181	.....	.....
32	5	260	730	1040	18.0	25.4	28.2	23.9	150.0	.768	1.176	.....	.....
33	2	160	460	720	10.8	15.6	12.1	12.8	148.0	.759	1.190	.....	.....
34	1	150	510	880	11.5	6.7	5.8	8.0	149.0	.764	1.181	.....	.....
35	½	160	500	940	14.0	15.7	4.5	11.4	148.0	.759	1.190	.....	.....
36	¼	150	460	840	36.0	42.4	29.0	35.8	147.0	.752	1.200	.....	.....
Average		190	560	920	19.5	22.9	18.0	20.1	148.5	.761	1.186	.....	.....
Grand Average for All Consistencies													
	10	1450	2570	3210	7.8	10.9	10.9	....	155.0	.834	1.085	.64*	10.1*
	5	1280	2470	3040	8.3	11.7	11.2	....	154.0	.835	1.084	.66*	8.7*
	2	1010	2020	2670	9.8	9.9	9.7	....	154.0	.831	1.089	.62*	9.3*
	1	1010	2140	2760	8.3	7.4	9.4	....	154.0	.830	1.089	.69*	9.0*
	½	840	1820	2500	14.0	14.9	9.1	....	153.0	.827	1.094	.77*	14.0*
	¼	790	1610	2230	26.7	32.9	27.0	....	152.0	.819	1.106	.91*	17.0*

*Does not include 200% Consistency.

TABLE 6

EXAMPLE OF INFLUENCE OF WATER ON THE STRENGTH OF CONCRETE

Values calculated from equation.

$$S = \frac{A}{Bx} = \frac{14000}{8.2x}$$

Where S = Compressive strength
x = Water ratio.
A and B are constants whose values depend on quality of cement and other conditions.

The water ratio is equivalent to the cubic feet of water to 1 sack (1 cu. ft.) of cement.

The strength values are solely for comparative purposes in showing the influence of changing the water ratio. The table is based on the following assumptions: Mix 1-4 relative consistency 110%, aggregate graded 0-1¼ in., mixed 1 min.

Water in a 1-Bag Batch: Gallons	Water Ratio (x)	Relative Consistency, per Cent	Compressive Strength of Concrete at 28 Days: Lb. per Sq. In (S)	Relative Strength, per Cent
5.75	.77	100	2770	100
6.0	.80	104	2600	94
6.25	.84	109	2400	87
6.5	.87	113	2250	81
7.0	.94	122	1950	70
7.5	1.01	131	1670	60
8.0	1.07	139	1470	53
9.0	1.21	157	1100	40
10.0	1.34	174	830	30
12.0	1.60	208	480	17
15.0	2.00	260	200	7

*Continued from our issue of December 25, 1918, page 781.

TABLE 5

A STUDY OF THE TIME OF MIXING CONCRETE—(SERIES 93)

(Effect of Mix and Size of Aggregate)

Compression tests of 6 by 12-in. cylinders.
Mix by volume.
Concrete in this series was mixed to 110% relative consistency.
Aggregates—sand and pebbles from Elgin, Ill.
Mixing was begun after all materials were in the drum.
Machine mixed cylinders made 16 in a batch; 4 for test at each age. In the order of making No. 1, 5, 9 and 13 were tested at 7 days; No. 2, 6, 10 and 14 at 28 days, etc.
Only one batch of machine-mixed concrete was made for each mix, grading and time of mixing. The mixing of the batches for a given mix and grading were distributed over a period of 4 weeks. All the 10-min. batches were mixed first, the 5-min. next, etc.
Hand-mixed specimens were made for comparison with machine-mixed concrete.
Specimens stored in damp sand; tested damp.
The 1-year tests in this series are not yet due.

Ref. No.	Mix by Vol.	Water Ratio to Cement by Vo.	Aggregate Range in Size, Ins.	Aggregate Weight, Lb. per Cu. Ft.	Aggregate Density	Time of Mixing, Min.	Concrete Compressive Strength, Lb. per Sq. In. 7d.	28d.	3m.	Concrete Weight, Lb. per Cu. Ft.	Concrete Density	Concrete Yield
Machine-Mixed Concrete												
1	1-2	.60	0-1¼	130.0	.780	10	2440	4410	5960	153.4	.803	1.276
2						5	2420	4080	6220	151.5	.792	1.293
3						2	1760	3550	5180	152.8	.799	1.281
4						1	1330	3400	5060	152.0	.794	1.286
5						½	1420	3160	5160	150.0	.784	1.305
6						¼	1180	2970	4690	150.2	.786	1.303
Average							1760	3600	5380	151.6	.793	1.291
7	1-3	.70	0-1¼	130.0	.780	10	2100	3760	4980	154.0	.823	1.143
8						5	1720	3480	5260	153.2	.820	1.148
9						2	1390	3300	4960	152.8	.816	1.152
10						1	980	3000	4760	153.2	.821	1.148
11						½	840	2300	4360	152.7	.816	1.153
12						¼	810	2060	4000	151.2	.809	1.164
Average							1310	2990	4720	152.8	.818	1.151
13	1-4	.81	0-1¼	130.0	.780	10	1380	2380	3730	153.2	.831	1.085
14						5	1340	2730	4100	153.2	.831	1.085
15						2	1090	2310	4330	154.0	.835	1.080
16						1	760	2320	3430	153.4	.832	1.083
17						½	650	2060	3850	153.5	.833	1.082
18						¼	600	1820	3240	152.2	.826	1.092
Average							960	2270	3780	153.2	.831	1.084
19	1-5	.91	0-1¼	130.0	.780	10	1380	2600	3460	154.1	.830	1.057
20						5	1170	2340	3460	153.5	.826	1.062
21						2	590	1370	2620	153.2	.824	1.064
22						1	490	1670	2620	153.3	.825	1.063
23						½	460	1490	2880	152.6	.820	1.060
24						¼	460	1520	3150	153.0	.823	1.065
Average							760	1830	3030	153.3	.825	1.062
25	1-6	1.01	0-1¼	130.0	.780	10	1260	2370	3510	154.4	.849	1.013
26						5	860	1910	3150	153.2	.844	1.020
27						2	760	1910	3040	153.5	.845	1.018
28						1	440	1450	2640	153.1	.843	1.021
29						½	450	1340	2270	153.3	.845	1.019
30						¼	400	1440	2320	153.0	.842	1.022
Average							700	1740	2820	153.4	.845	1.019
31	1-7	1.10	0-1¼	130.0	.780	10	1020	1920	2880	154.8	.857	.991
32						5	780	1640	2790	153.1	.847	1.002
33						2	790	1870	3110	153.8	.852	.997
34						1	480	1420	2160	153.0	.847	1.002
35						½	440	1240	2280	153.2	.848	1.001
36						¼	350	1020	1700	152.8	.845	1.004
Average							640	1520	2490	153.4	.849	1.000
37	1-9	1.32	0-1¼	130.0	.780	10	650	1240	2040	154.5	.861	.969
38						5	460	1100	1990	153.2	.854	.977
39						2	480	1110	1980	153.9	.859	.972
40						1	220	720	1370	151.3	.844	.989
41						½	280	720	1400	149.1	.831	1.003
42						¼	260	810	1460	150.0	.837	.997
Average							390	950	1710	152.0	.848	.984
43	1-15	1.94	0-1¼	130.0	.780	10	320	530	950	150.0	.843	.963
44						5	250	560	970	149.9	.842	.964
45						2	150	360	570	144.7	.814	.998
46						1	140	460	910	143.7	.808	1.005
47						½	110	310	470	142.6	.803	1.012
48						¼	110	240	390	141.8	.797	1.018
Average							180	410	710	145.4	.818	.993
49	1-5	1.57	0-1¼	104.0	.624	10	240	490	990	131.6	.665	1.084
50						5	160	380	940	129.0	.653	1.105
51						2	130	430	810	129.5	.654	1.102
52						1	110	280	560	128.0	.648	1.112
53						½	70	200	400	126.3	.640	1.128
54						¼	20	50*	110	125.0	.632	1.140
Average							120	310	640	128.2	.649	1.112
55	1-5	1.51	0-⅜	110.0	.660	10	280	580	1080	134.0	.688	1.101
56						5	230	580	1200	131.8	.677	1.118
57						2	180	480	920	131.1	.672	1.126
58						1	140	470	1060	132.0	.677	1.118
59						½	80	250	490	129.5	.665	1.139
60						¼	30	100*	230	127.5	.654	1.157
Average							160	410	830	131.0	.672	1.126
61	1-5	1.43	0-¼	115.0	.690	10	370	760	1400	137.0	.710	1.108
62						5	310	670	1620	133.0	.690	1.140
63						2	180	520	1060	134.9	.700	1.124
64						1	200	650	1630	135.5	.703	1.119
65						½	110	220	610	133.2	.691	1.138
66						¼	50	180	270	131.8	.684	1.150
Average							200	500	1100	134.2	.696	1.130
67	1-5	1.25	0-⅜	122.5	.741	10	500	1020	2030	141.8	.753	1.114
68						5	460	1090	2100	144.5	.767	1.093
69						2	310	1000	1970	143.6	.762	1.100
70						1	280	1000	2200	142.5	.757	1.108
71						½	230	760	1590	141.0	.748	1.120
72						¼	160	500	1090	141.7	.752	1.115
Average							320	890	1830	142.5	.756	1.108
73	1-5	1.08	0-¾	126.5	.759	10	840	1700	2830	150.8	.812	1.053
74						5	510	1590	3010	149.6	.806	1.062
75						2	460	1390	2900	150.5	.811	1.055
76						1	380	1300	2640	147.9	.796	1.074
77						½	360	1000	2400	147.5	.794	1.077
78						¼	250	840	1840	146.8	.791	1.082
Average							470	1300	2600	146.8	.802	1.067
79	1-5	.82	0-2	128.5	.771	10	1410	2300	3290	157.2	.867	1.002
80						5	980	2260	3540	156.6	.863	1.006
81						2	790	2020	3320	156.7	.864	1.005
82						1	740	2000	3260	155.5	.858	1.012
83						½	560	1780	2700	155.0	.855	1.016
84						¼	600	1560	2810	149.8	.827	1.051
Average							850	1990	3150	155.1	.856	1.051

*All specimens broken in removing forms; strengths interpolated from other tests.

TABLE 5A

A STUDY OF THE TIME OF MIXING CONCRETE

A summary of the values given in Table 5.

Reference No. (See Table 5)	Time of Mixing, Min.	Concrete Compressive Strength Lb. per Sq. In. 7d.	28d.	3m.	Concrete Weight, Lb. per Cu. Ft.	Concrete Density	Concrete Yield
Grand Average of All Mixes and Aggregates—Machine-Mixed Concrete							
1, 7, 13, 19	10	1010	1860	2800	148.6	.799	1.068
2, 8, 14, 20	5	830	1750	2880	147.5	.794	1.077
3, 9, 15, 21	2	650	1540	2630	147.5	.793	1.077
4, 10, 16, 22	1	480	1440	2450	146.7	.790	1.082
5, 11, 17, 23	½	430	1200	2200	145.6	.784	1.090
6, 12, 18, 24	¼	380	1080	1950	144.8	.779	1.097
Grand Average of 0-1¼ Aggregates and All Mixes—Machine-Mixed Concrete							
1, 7, 13, 19, 25, 31, 37 & 43	10	1320	2400	3560	153.8	.837	1.062
2, 8, 14, 20, 26, 32, 38 & 44	5	1120	2230	3490	152.6	.832	1.069
3, 9, 15, 21, 27, 33, 39 & 45	2	880	1970	3220	152.3	.830	1.070
4, 10, 16, 22, 28, 34, 40 & 46	1	600	1800	2870	151.6	.827	1.075
5, 11, 17, 23, 29, 35, 41 & 47	½	580	1580	2830	150.9	.822	1.079
6, 12, 18, 24, 30, 36, 42 & 48	¼	520	1480	2620	150.5	.821	1.083
Grand Average of 1-5 Mixes and All Aggregates—Machine-Mixed Concrete							
19, 49, 55, 61, 67, 73 & 79	10	720	1350	2150	143.8	.761	1.074
20, 50, 56, 62, 68, 74 & 80	5	550	1270	2280	142.6	.755	1.084
21, 51, 57, 63, 69, 75 & 81	2	380	1030	1940	142.8	.755	1.082
22, 52, 58, 64, 70, 76 & 82	1	330	1050	2000	142.1	.752	1.087
23, 53, 59, 65, 71, 77 & 83	½	270	810	1580	140.7	.745	1.097
24, 54, 60, 66, 72, 78 & 84	¼	220	680	1360	139.4	.738	1.109

TABLE 7

EFFECT OF TIME OF MIXING ON THE STRENGTH OF CONCRETE

Based on 28-day compression tests of 6 by 12-in. cylinders.
The values given in the table are percentages of the strength of the same concrete mixed for 1 min.
These values may be expressed by an equation of the form

$$P = k + n \log t$$

When P = percentage of strength of 1-min. mix
t = time of mixing in seconds.
k and n are constants, which depend on the mix, consistency, age and other conditions of the test.

Mix	Values Based on Series No.	Relative Consistency, per Cent	Size of Agg.	Strength at Different Mixing Periods as Compared with the Strength at 1 Min. (P) ¼ m. 15s.	½m. 30s.	¾m. 45s.	1m. 60s.	1½m. 90s.	2m. 120s.	5m. 300s.	10m. 600s.	28 Days. Comp. Strength 1-Min. Mix, Lbs. per Sq. In.	Values of Constants in Equation (k)	(n)
1-4	89	90	0–1¼	77	89	95	100	106	112	127	138	3200	+32	39
1-4	89	100	0–1¼	76	88	95	100	107	112	128	141	2650	+28	40
1-4	89	110	0–1¼	81	91	97	100	106	110	123	133	2230	+43	32
1-4	89	125	0–1¼	87	93	97	100	104	106	115	122	1750	+61	22
1-4	89	150	0–1¼	86	93	97	100	104	107	117	124	1000	+58	24
1-4	89	200	0–1¼	90	95	98	100	103	105	112	118	560	+69	17
1-2	93	110	0–1¼	86	93	97	100	104	107	117	124	3450	+57	24
1-3	93	110	0–1¼	76	88	96	100	107	113	129	131	2700	+20	40
1-4	93	110	0–1¼	81	91	97	100	106	110	123	133	2230	+43	32
1-5	93	110	0–1¼	78	89	96	100	107	112	127	138	1800	+33	38
1-6	93	110	0–1¼	78	89	96	100	107	112	127	138	1550	+33	38
1-7	93	110	0–1¼	76	88	95	100	107	113	129	141	1300	+28	41
1-9	93	110	0–1¼	79	89	96	100	106	110	124	135	900	+38	35
1-15	93	110	0–1¼	62	81	92	100	111	119	144	163	350	−12	63
1-5	93	110	0–1¼	28	64	85	100	120	136	184	222	250	−116	122
1-5	93	110	0–⅜	39	70	89	100	120	133	176	208	340	−87	107
1-5	93	110	0–4	50	75	90	100	114	125	159	184	440	−49	100
1-5	93	110	0–½	79	90	96	100	106	110	125	135	840	+38	35
1-5	93	110	0–¾	73	87	94	100	108	114	132	146	1200	+20	45
1-5	93	110	0–1¼	78	89	96	100	107	112	127	138	1800	+33	38
1-5	93	110	0–2	81	91	96	100	106	109	122	131	1900	+44	32

[The results of the very comprehensive tests recorded by Professor Abrams are well worth several readings and careful study and comparison. They disclose facts of the utmost importance to all who have an interest in the development of the use of concrete. The outstanding points developed are the effect of time of mixing, the effect of the amount of water used and the curing of the concrete after being placed in position.

It is readily seen that a rational enforcement of each of these requirements will meet with opposition on the part of that class of contractors, architects and engineers who measure construction service in terms of speed rather than quality. It can be readily seen, however, that the expenditure of more time with an added labor cost is more than compensated for in the added strength and durability of the product.

THE AMERICAN ARCHITECT has on several occasions referred to the dangers of excess water in mixing concrete. Every observing person who has passed under a concrete floor, recently poured, has noticed the results of the leakage from above. The floor below is covered with a coating of cement and ridges of cement from ¼ to 1 in. high under the joints in the forms above indicate a serious washing out of the cement. It is shown by the tests that excess water weakens the concrete where no leakage occurs comparable to that in building construction and it may safely be assumed that the results in actual practice are more disastrous than under test conditions. The reduction in water content of concrete may require a modification of those placing equipments which require the concrete to be "sloppy." When the necessity of less water is appreciated by specification writers and such specifications become common a suitable equipment will be furnished, although the present-day carts or buggies are entirely suitable.

The consistency of concrete based on the volume of water to cement (1 cu. ft. per bag) appears to be the logical terms to employ as they are the only factors entering into concrete that are not variable in character.

By referring to Fig. 23 it appears that a rate of rotation of the mixer of 18 to 20 r.p.m. produces the best results. Fig. 15 clearly indicates the effect of time of mixing for all mixes tested. It shows an added strength of 250 to 300 lb. per square inch in compression by continuing the mixing from one to two minutes and an added strength of about 500 lb. per square inch if continued for a period of three minutes. As 1-2-4 concrete ordinarily runs this is an addition of 15 and 25 per cent respectively. This would require the use of two mixers in many cases, but the results justify the means employed. By reducing the water content to a minimum workable percentage these gains are conserved, and in no other way. The rule given on page 750 should be constantly kept in mind. The statement on page 776 further emphasizes this point. The importance of curing is summarized on page 780.

While Professor Abrams' program of tests is not yet completed, the results so far obtained evidently justify modifications of specifications for concrete along the lines here indicated, with the result that increased fiber stresses can be used with the consequential saving in materials.]

Industrial Information

In this Department there is published each week information as to the development of materials and methods, derived from reliable sources.

Corr Plate Floors

In good technical form and with much scientific precision the Corrugated Bar Co., Buffalo, N. Y., presents an analysis of advantages to be derived from the use of Corr Plate Floors.

In perfecting methods of concrete construction, commercial organizations have developed a product which is helping, in a valuable way, to fill the ever present need for economy and good service. Among such organizations the Corrugated Bar Co. has been active in developing concrete and steel in combination. This has involved a practical, scientific analysis of the action of steel and concrete as used together, and has developed certain workable formulas for rectangular and "tee" beams. The principles surrounding the correct type of reinforcement, it would seem, have been given careful research and consideration by this company. The results of their investigations are printed in handbooks which they state are considered standard works of reference and have been translated into six important foreign languages.

The Corr Plate Floor is a flat slab, two-way sys-

tem, characterized, the makers put it, by its particularly efficient method of distribution of the reinforcement so as to conform to a variation in moment that is necessarily gradual in whatever direction this variation may be considered. It combines economy of material with simplicity of construction. It does away with the need for beams and girders. This affords a smooth ceiling and reduces largely the number of sprinkler heads required. Windows can be built clear to the ceiling, admitting more light and affording better ventilation. By its use space is saved. From one to one and a half feet is gained in every story, which may amount to a story in height for about every eight. It can be erected quickly and at low cost, not only because of the simplicity, but also due to the fact that the element of safety is practically uniform throughout, there is saving in the quantity of material used, both in concrete and in reinforcement.

This company offers architects a definite guaranteed service insuring safety, economy and patent protection, without imposing the use of its own materials. Details may be obtained by addressing the Corrugated Bar Co., Buffalo, N. Y.

Pine and the Architect

The surest way to increase the consumption of any material is through well-directed campaigns of education in its use. A commodity that can be used in any undertaking, from the smallest to the largest, has a universal adaptability. There is often, however, failure to avail of it through ignorance of its application or its adaptability to various purposes.

Take, for example, the propaganda of the Southern Pine Association, sent forth from its head offices in New Orleans. Most men believe they know all about wood. If they desire to test themselves on this subject let them send for one or all of the many pamphlets the Southern Pine Association publishes, and check up their knowledge.

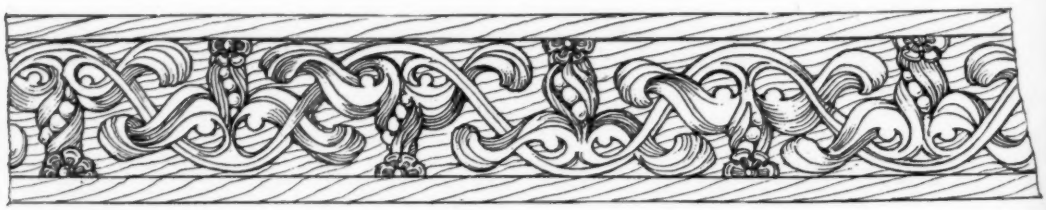
For instance, there is a large and fully illustrated pamphlet on creosoted wood block pavements. How desirable are such pavements, how extensively are they laid? What is the cost of laying and of upkeep? What are the sanitary advantages? Find the answers to these and other equally pertinent questions in this pamphlet.

Mill construction is coming into its own. Get the pamphlet "Heavy Timber Mill Construction Buildings." It is written by an engineer; full of facts, diagrams and illustrations. It is a guide and handbook to be had for the asking.

How can you most economically and safely use wood in interiors? Two pamphlets answer that question: "The Interior of Your Home" and "Beauty Plus Service in Floors." The first illustrates actual interiors, tells of the best and most artistic finishes and gives colored plates of these finishes. The second is a handbook on floors.

Other equally instructive pamphlets are published by the Yellow Pine Association: "School Architecture" contains many suggestive plans and good elevations. "Implement Sheds"—the farmer no longer leaves his machinery out of doors all winter; he has learned better. "Service and Economy in Building," full of facts and interesting illustrations. And a brochure, "Facts Worth Knowing About Turpentine," which makes good its title.

This series of pamphlets puts the user of pine in full possession of an encyclopædic knowledge and as there is reliability and a long and honorable reputation back of the company that sends them out, they can be read and digested with much profit and increase of knowledge of a specific material.

Standard Textile Products Co.

Announcement is made that the corporate name of the Standard Oil Cloth Co. has been changed to the Standard Textile Products Co. The object of the change is to designate more comprehensively the various kinds of products manufactured and marketed by that company. Its organization and management will remain as heretofore and is in no way affected by this action. Headquarters continue at 320 Broadway, New York.